DIESEL PROGRESS

GAS TURBINE

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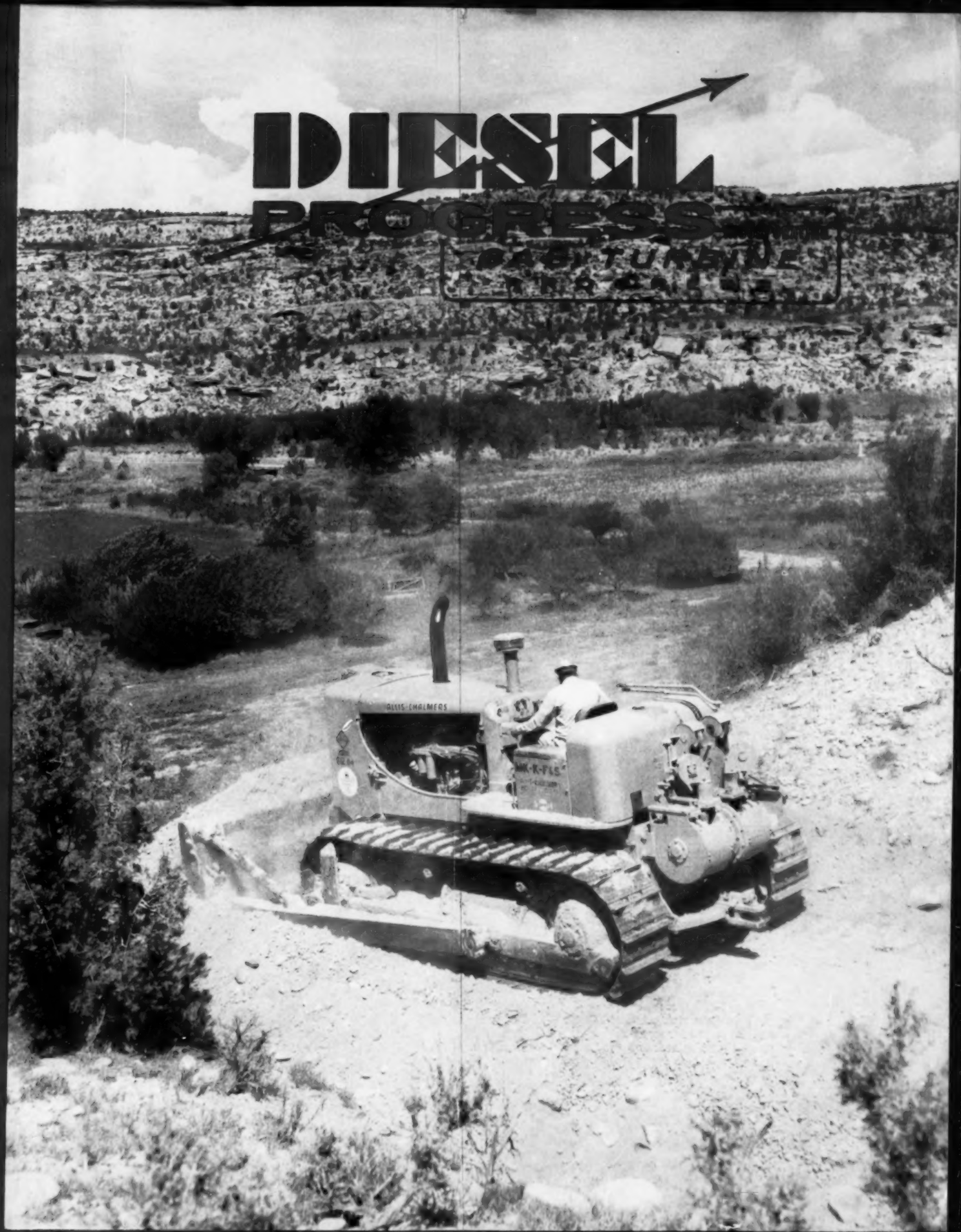

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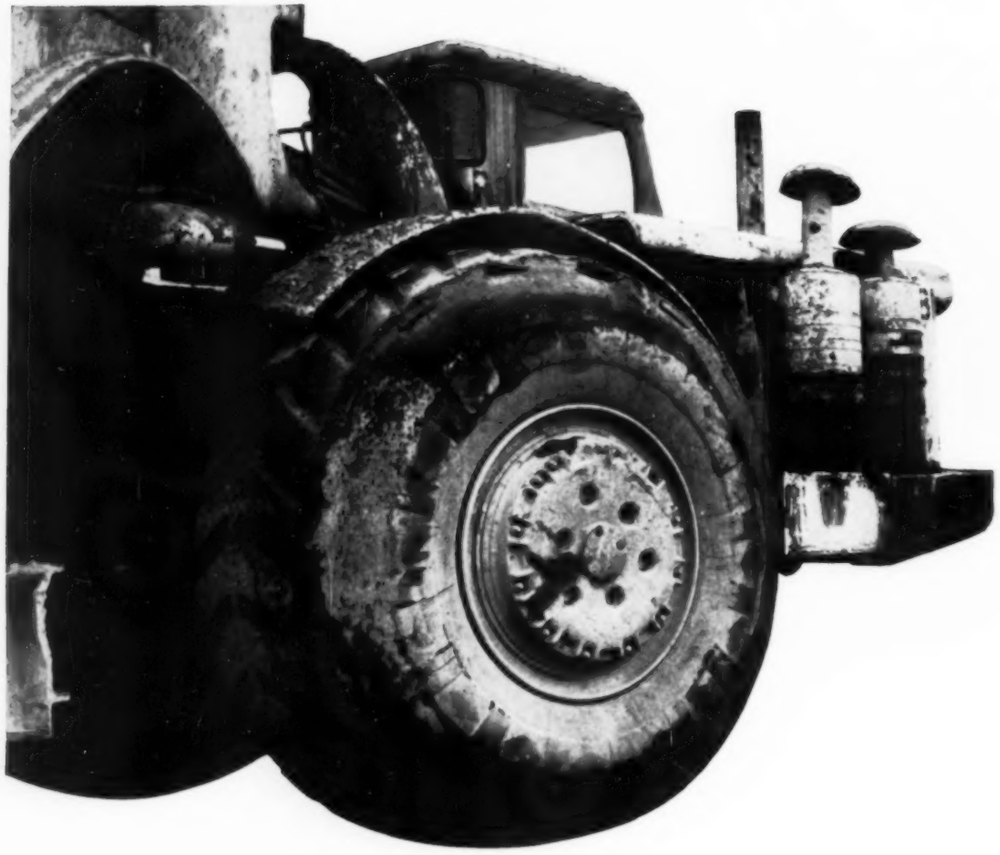


How Texaco Ursa Super Duty helps contractors

KEEP DIESELS "ON THE GO"

Whether you're using king-sized diesels like the one above, or any type of diesel-powered truck, shovel, tractor or bulldozer, your best bet to assure full power and dependable, trouble-free operation is Texaco Ursa Super Duty. It's especially processed to make diesel engines deliver *more power* with *less fuel* for *longer periods* between overhauls. It does it by preventing deposits, and keeping rings free and ports clear. This assures the full-power compression needed for complete combustion.

Furthermore, Texaco Ursa Super Duty resists oxidation and sludging, and protects your diesels against wear and corrosion.

There's a complete line of Texaco Ursa Oils to meet any and all of your requirements. Ask your local Texaco Lubrication Engineer to help you select the right ones—and let him help you simplify your entire lubrication procedure with a Texaco Simplified Lubrication Plan. Just call the nearest of the more than 2,000 Texaco Distributing Plants, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

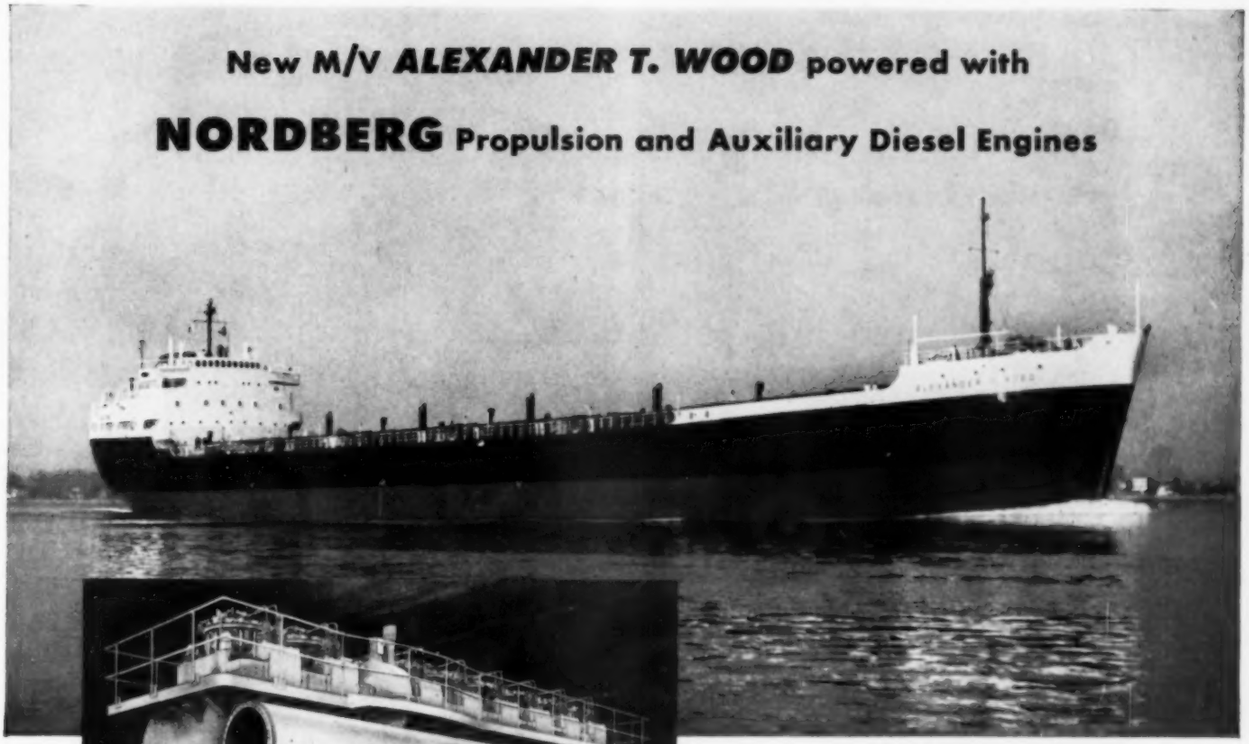
TUNE IN . . . Metropolitan Opera Radio Broadcasts Saturday Afternoons—CBS

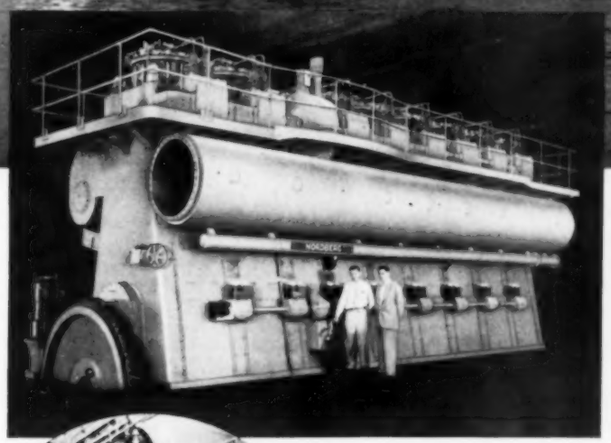
LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

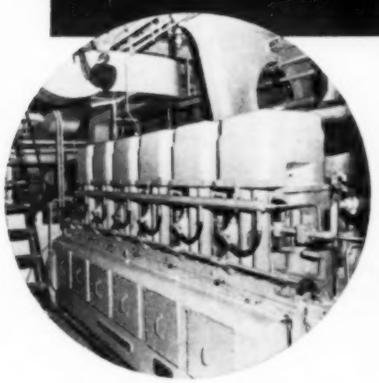
(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

New M/V *ALEXANDER T. WOOD* powered with

NORDBERG Propulsion and Auxiliary Diesel Engines







View of the 6800 hp Nordberg 8-cylinder, two-cycle diesel propulsion engine which drives a single controllable-pitch propeller at 168 rpm.

Engine room view, showing one of the two Nordberg four-cycle diesel engines rated 900 hp at 450 rpm, each driving 635 kw AC generators for auxiliary power.

. . . 20,580 dwt vessel is largest ocean-going cargo carrier built in Canada

A 6800 hp Nordberg 2-cycle diesel engine provides main propulsion power for the new M/V *ALEXANDER T. WOOD*, built by Canadian Vickers Limited for Westriver Ore Transports Limited, both of Montreal. In addition to her main engine, this new dry cargo carrier also relies on Nordberg auxiliary power, furnished by two 900 hp 4-cycle diesel generating units.

The Nordberg 29" x 40" main engine is designed to burn the heaviest type of bunker oil, and is directly coupled to a 14'—6" diameter controllable pitch propeller, to meet the diverse conditions of service scheduled for the "*WOOD*".

Present plans call for the operation of this modern 20,580 dwt vessel in ore carrying service between Sept Iles, Quebec and various U.S. East Coast ports, the European Continent, as well as Contrecoeur, Quebec. Next winter, the "*WOOD*" will carry ore out of Venezuela. With the opening of the St. Lawrence Seaway, the 578 ft. vessel is expected to operate through to the Great Lakes.

Call or write for further information on Nordberg Marine Diesels for main propulsion and auxiliary service, outlining your power requirements.

NORDBERG MFG. CO.
Milwaukee 1, Wisconsin

NORDBERG

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HM158

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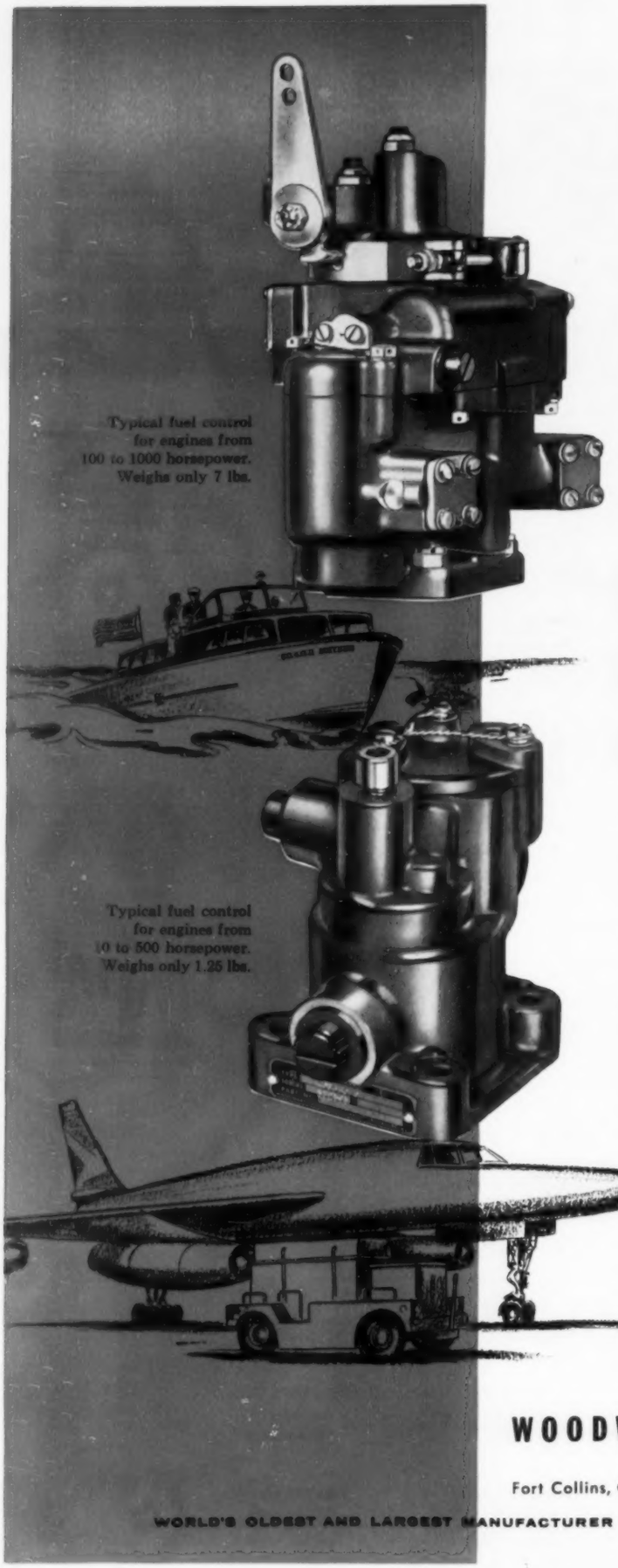
FRONT COVER ILLUSTRATION

Two HD-21 crawler tractors powered by the new Allis-Chalmers turbocharged 21,000 diesels at work at the Navajo Dam in New Mexico.



The 89 years of experience, the skilled personnel and the excellent facilities that make Woodward governors the standard of the world for diesel and gas engine control have also established the standard in the gas turbine field.

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Fuel Controls for Gas Turbine Engines

Woodward controls are in use on or have been developed for practically every type and size of gas turbine engine — power for boat propulsion . . . for aircraft propulsion and ground power units . . . for stand-by generator sets . . . for fire pumps . . . for air-borne power generator sets . . . etc.

In addition to speed governors in various sizes — isochronous or speed droop type — we build acceleration limiters, fuel control valves and differential relief valves to form an integrated fuel control system.

We will be glad to send more detailed information very promptly to builders of gas turbine engines and of equipment using these modern prime movers.

Don't forget the ASME Gas Turbine Division Meeting and Equipment Display.
March 9-11, Netherland Hilton Hotel, Cincinnati, Ohio.

Don't forget the Oil and Gas Power Division Meeting and Equipment Display.
April 20-23, Shamrock Hotel, Houston, Texas

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ROCKFORD, ILLINOIS

Fort Collins, Colorado — Schiphol, The Netherlands

WORLD'S OLDEST AND LARGEST MANUFACTURER OF HYDRAULIC GOVERNORS EXCLUSIVELY

With 34' beam and 3½' draft, the M/V Yukon cruises easily at 12.5 knots while towing 600-ton oil barge along the 2,300 mile course of shallow but swift waters.

ALASKAN TOWBOAT USES BENDIX FUEL INJECTION TO OPERATE ALL SEASON LONG

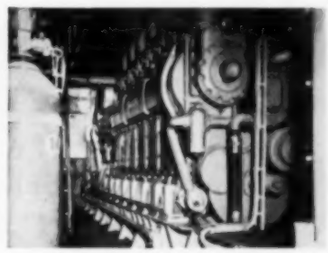
Because the tricky Yukon River is open only four months a year, towboats must operate day and night if the tight freight schedules are to be maintained. Dependable performance is the reason Bendix* Diesel Fuel Injection equipment is in use on the 120′ steel-hulled, twin-screw M/V *Yukon*, operated by the Alaska Railroad.

Chief Engineer of the *Yukon*, Carl Hagen, gives full credit for top towboat performance to his two Enterprise Model DM6-6 diesels equipped with Bendix Fuel Injection. Mr. Hagen reports: "Easy starting, fast response, low maintenance, economical operation as well as complete dependability."

In our new 49th state, as throughout the world, wherever the job requires dependable performance with low operating costs Bendix is the choice for fuel injection equipment.

*REG. U. S. PAT. OFF.

Chief Engineer Carl Hagen has logged 6,000 hours with his Enterprise diesels and never an hour lost.



One of the twin hydraulically controlled 6-cylinder Enterprise 12" bore x 15" stroke diesels, rated 600 HP at 600 RPM.

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Sidney, New York

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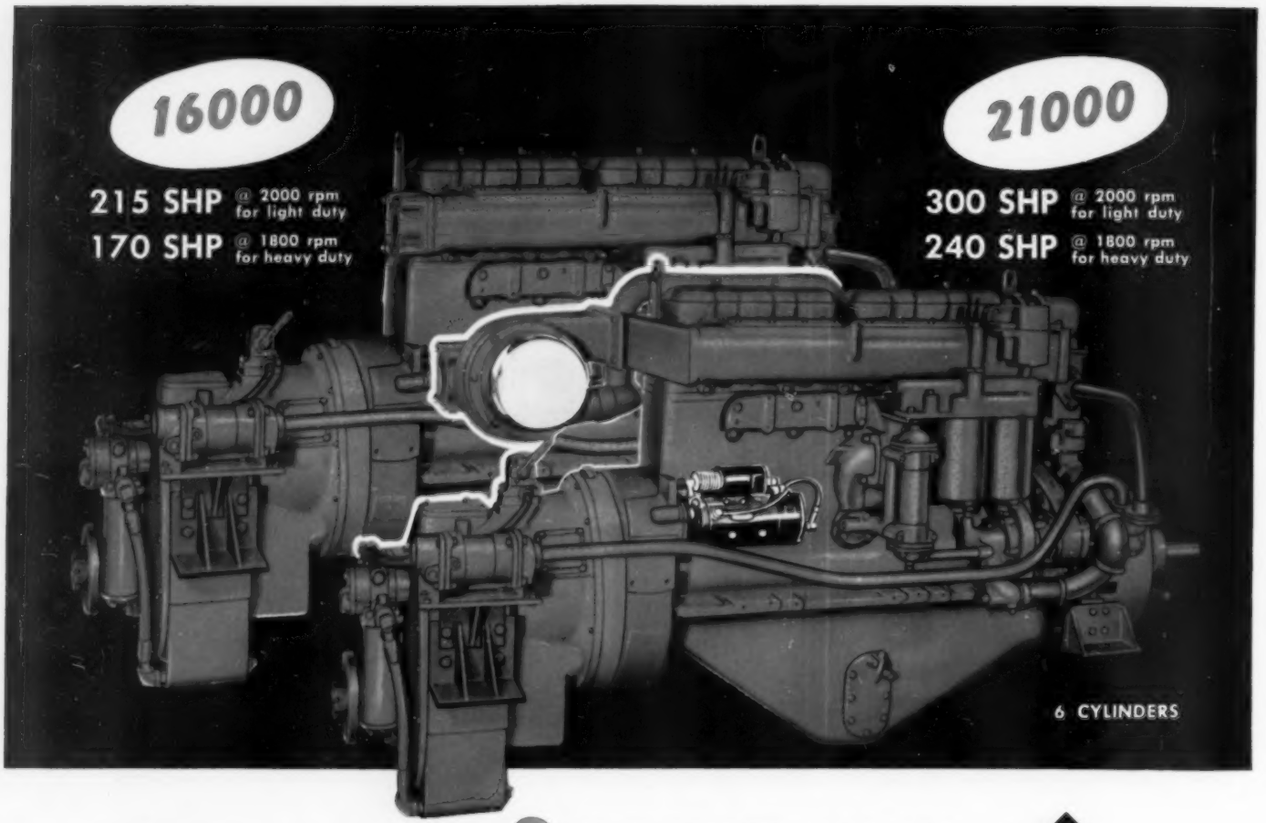
AVIATION CORPORATION

Export Sales & Service: Bendix International Division, 205 E. 42nd St., N. Y. 17, N. Y.


16000
215 SHP @ 2000 rpm for light duty
170 SHP @ 1800 rpm for heavy duty
21000
300 SHP @ 2000 rpm for light duty
240 SHP @ 1800 rpm for heavy duty
6 CYLINDERS

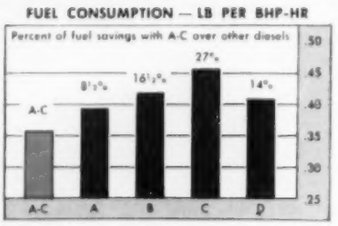
Announcing 2 GREAT NEW MARINE DIESELS that give you...

More Working Horsepower

The new Allis-Chalmers 21000 and 16000 marine diesels provide *honest*, usable horsepower. *Ratings represent power available at the propeller shaft* — no deductions for reduction gear or other marine accessories. This is all *working* horsepower!

Unmatched Fuel Economy

Compare their fuel economy to others in their class. Economy like this gives you from 1 to 2½ hours of extra performance every day.



New Combustion System

These diesels have a NEW combustion system that provides *thorough* mixing of air and fuel for complete combustion. (Write for full details on Allis-Chalmers' new combustion system.)

Clean Design

These new diesels are products of advanced, "know-how" marine engineering.

Let your Allis-Chalmers dealer show you the many other features that put *profit* in performance of the new 21000 and 16000. Write for FREE new 16-page bulletin BU-540 and specification bulletins. Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

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BM-33

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1958 Diesel Engine Catalog

New complete information on engines and accessories

look at the contents

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4. **ACCESSORY EQUIPMENT**—Recent developments in fuel injection systems, governors, and other key accessory units are detailed and illustrated fully in this section.
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6. **ADVERTISING**—Leading manufacturers of engines, accessories, and services bring out the important features of their products in attractive, easy to read advertisements to further enhance the reference value of the CATALOG.

This brand new edition of the 1958 DIESEL ENGINE CATALOG is now available.

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VOLUME 23 of the DIESEL ENGINE CATALOG is now available and is the biggest, most complete edition published to date. It has been completely revised and rewritten with many new or extensively changed sections graphically describing new engines and accessories. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, this new Catalog is a practical necessity. Recognized as the "Bible of the Industry," the 1958 DIESEL ENGINE CATALOG is a big 400-page book. With the same size and wide-open format as in previous editions, reference is simple and quick. Each section is fully illustrated with pictures, power curves, specification charts and sectional views. Equally important, the text presents a full description of the products and their fields of application.

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STOPPED THIS MUCH DIRT

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The 18 pounds of dirt shown above were stopped by a Purolator heavy duty dry type air filter on a rock drilling rig in 940 hours of operation—with no servicing of the filter required. The 6 cylinder, 2 cycle engine and the 750 CFM compressor used on the job were fully protected through the toughest operating conditions. 18 pounds of dirt were stopped . . . none got through the filter.

There's a Purolator dry type air filter designed to meet the specific requirements of your operation. Write today for full information. If you have a particularly tough problem, describe it . . . Purolator has the solution.

Filtration For Every Known Fluid

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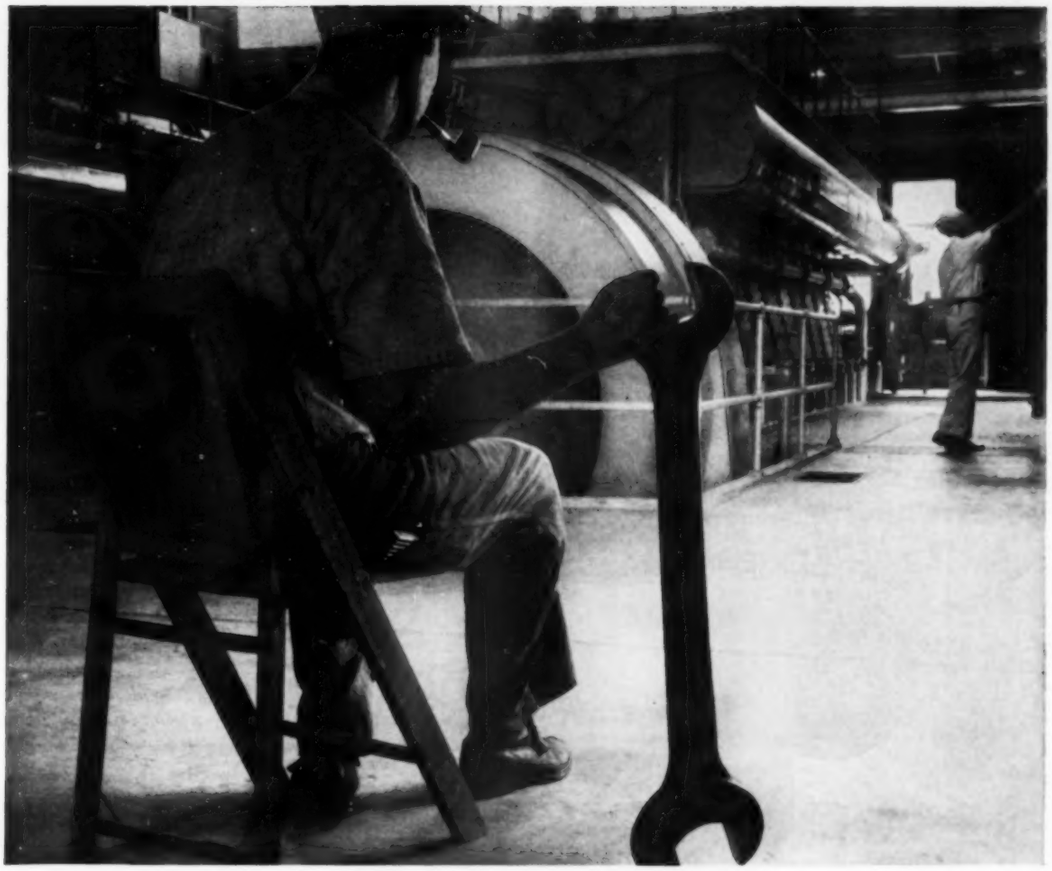

The case of the unused wrench

How know-how and Cities Service Oil pay off for Easton Utilities Commission

Take five men with 111 years' experience in power plant operation . . . add Cities Service DC-300 Lube Oil . . . and you can retire the big overhaul wrench to the nearest rocking chair.

That's precisely what Easton Utilities Commission of Easton, Maryland has done!

Under the management of Supt. William Krumbine (41 yrs. experience) and his team of specialists, overhauls and maintenance problems have become a rarity.

Take the generator pictured above. Using Cities Service DC-300 Oil, they've had it operating 600 to 700 hours a month for over three years without losing a bearing or a piston . . . and without even changing oil! Oil is added, but never changed, thanks to its unusual stability and outstanding detergent-dispersant characteristics. Compression, fire pressure, and fuel economy are excellent.

If you're looking for a lube oil that can reduce friction, resist oxidation, and boost fuel economy, talk with a Cities Service Diesel Lubrication Engineer. Call the nearest office or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

111 YEARS' COMBINED EXPERIENCE is shared by five men responsible for Easton's outstanding maintenance record. Sticklers for efficiency, they are unstinting in praise for Cities Service DC-300 Lube Oil.

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NOW FOR THE FIRST TIME

NEW 385

INTERNATIONAL® UDT -

Here's the all-new 385 max. hp International UDT-817—a compact, heavy-duty 4-cycle, 6-cylinder engine thoroughly proven in six years of development and testing—backed by 26 years of experience manufacturing and selling over 400,000 heavy-duty diesel engines.

Designed for versatile application in all types of rugged hauling, excavating, construction, industrial and oil field equipment, the UDT-817 diesel answers the demand for dependable high power and lower cost of operation.

A wide variety of accessory equipment including air cleaners, flywheels for leading makes of torque converters and clutches, torque converter cooler, air control compressors, safety shut-offs, instruments and engine controls can be furnished to meet your installation requirements. Base, radiator, hood and dash, clutch and power take-off are available for complete power units.

For more specific information or application assistance, merely write or call International Harvester Co., Construction Equipment Division, Melrose Park, Illinois.

BRIEF SPECIFICATIONS

Type	4-cycle turbocharged
Bore and Stroke	5⅜ x 6"
Number of Cylinders	6
Displacement	817 cu. in.
Max. hp	385 @ 2100 rpm
Rated hp	375 @ 2100 rpm
Max. Torque	1,040 lbs. ft. @ 1400 rpm
Compression Ratio	16:1
Weight	3,540 lb.
Lbs. per max. hp	9.2
Length, fan to flywheel	61½"
Height	56½
Width	39½"
Flywheel housing SAE	No. 1

hp. 817

Features that add dependable, economical power to any product

- Fast direct starts with 24-volt electrical system.
- Direct injection of fuel under pressures to 20,000 psi by individual camshaft actuated multi-orifice injectors.
- Exclusive IH twin plunger metering pump directs equal and precise amounts of fuel to each injector in proper firing order according to load and speed demands.
- Turbocharger puts waste energy in exhaust gases to work for higher power output and lower fuel consumption.
- Dual intake and exhaust valves for free breathing efficiency.
- Positive valve rotators keep valve seats free of deposits.
- Aluminum alloy pistons working in replaceable wet cylinder sleeves with velocity swirl-flow water cooling on outside, jet oil cooling on inside, for long life operating temperatures.
- Fully counterbalanced Tocco-hardened crankshaft with seven big main bearings and torsional vibration damper for smooth, dependable, high power output.

International® Construction Equipment

International Harvester Co., 180 North Michigan Ave., Chicago 1, Ill.

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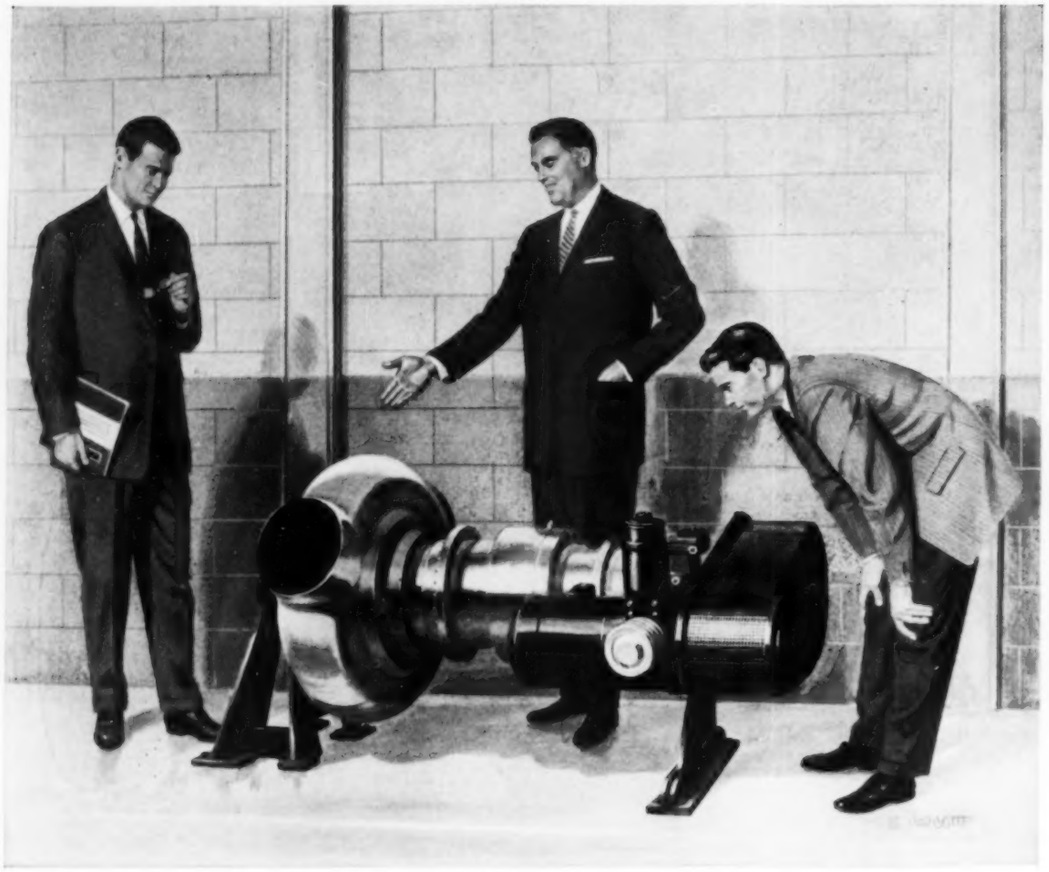

New 1100 hp Solar gas turbine offers small size, light weight, greater fuel efficiency

SOLAR'S NEW 1100 HP SATURN engine represents an important forward step in gas turbines. Advantages of the new power plant include these: it is extremely lightweight, averaging less than 1/10 the weight of conventional engines; it occupies only about 51 cubic feet; it starts instantly and takes full load without laboring in temperatures from −65F to 130F—even after long periods of standby service. In addition, the new Saturn engine offers an unequaled advance in gas turbine fuel efficiency, and it will operate on a great variety of fuels.

Today, proven-in-service Solar gas turbines—ranging from 50 to 500 hp—are creating new standards of performance and reliability. As propulsion units for speedy boats, as a power source for electric generators, as ground support units for advanced jet aircraft, as high-efficiency pumps and in other applications... Solar gas turbines are saving time and money for hundreds of satisfied users. Why not investigate the Solar family of gas turbines for *your* power needs? Write today to Dept. F-138, Solar Aircraft Company, San Diego 12, California.

CHARACTERISTICS OF THE SATURN GAS TURBINE

RATING	1100 hp (80F sea level)
WEIGHT	950 lb
OUTLINE DIMENSIONS (MAXIMUM)	
Length	69 in.
Width	45 in.
Height	44 in.

VISIT OUR BOOTH at the 4th Annual ASME Gas Turbine Power Division Exhibit, Cincinnati, Ohio, March 8-11

SOLAR AIRCRAFT COMPANY SAN DIEGO DES MOINES

ENGINEER'S FIELD REPORT

PRODUCT RPM DELO OIL

FIRM C. H. LAWSON, INC.

Using RPM DELO Oil heavy-duty engines outlast equipment

C. H. Lawson, Inc. operates 78 pieces of road building equipment ranging from new to 15 years old, all using RPM DELO Oil. Only one engine has ever required major overhaul and that was not due to lubrication. Firm's chief mechanic, E. C. Miller, says, "RPM DELO Oil has been used exclusively in all our heavy duty engines since 1944. In many cases, it has enabled engines to outlast the equipment." Euclid Earth Mover (above) gets a push from a bulldozer to provide extra traction in wet earth.

TD 24 International (left), one of firm's 12 bulldozers, helps clear the way for a Route 50 by-pass at Riverdale, Maryland. This two year old tractor has operated more than 4,000 hours without engine repairs. Company owner, C. H. Lawson (right), reports that RPM DELO Oil keeps the engines in his equipment in such good shape that—regardless of operating conditions—they average approximately 4 years or 10,000 hours service before even minor repairs are required.

Why RPM DELO Oils reduce wear—prolong engine life

- Oil stays on engine parts—hot or cold, running or idle
- Anti-oxidant resists lacquer formation
- Detergent keeps parts clean
- Special compounds prevent corrorosion of bearing metals
- Inhibitor resists crankcase foaming

For More Information or the name of your nearest distributor, write or call any of the companies listed below.

LUBRICATING OILS RPM DELO

TRADEMARK "RPM DELO" AND DESIGN REG. U.S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20

THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey

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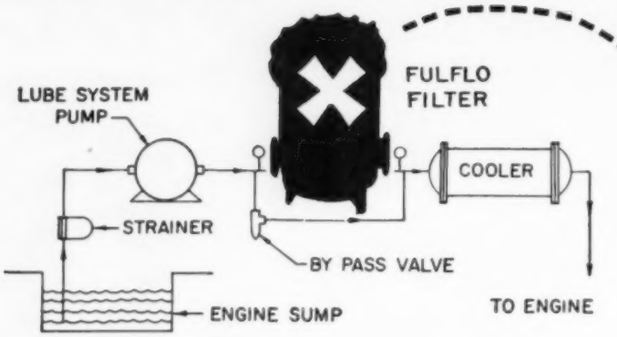
FULL FLOW SYSTEM



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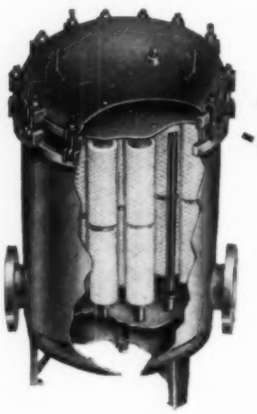
With Fulflo Filters at the heart of your lube filtration system, you reduce costly engine wear, downtime and maintenance.

Fulflo Filters provide continuous micro-clarity of lubricating oils . . . for stationary engines, mobile equipment or bulk filtration. Genuine Honeycomb Filter Tubes give true *depth* filtration through hundreds of filtering tunnels engineered for uniformity of size, shape, depth and density. You get the benefits of both absorptive and adsorptive filtration.



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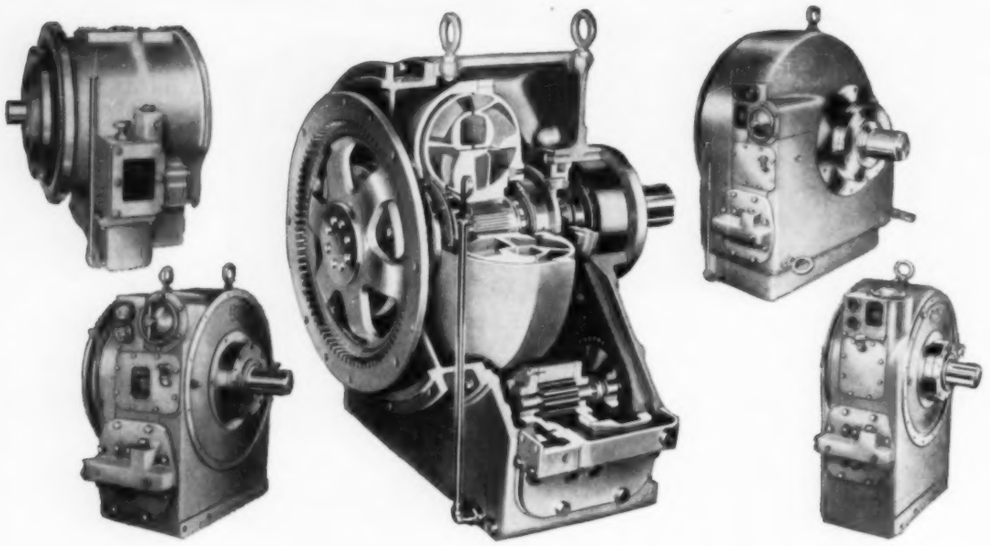

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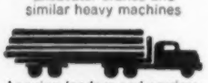

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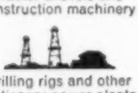

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Actual photo of a #6 residual fuel of the type burned regularly by two *Enterprise* Engines at the Municipal Power Plant, New Smyrna Beach, Florida.

ENTERPRISE Does —and saves this city up to $4200 per month in fuel costs!

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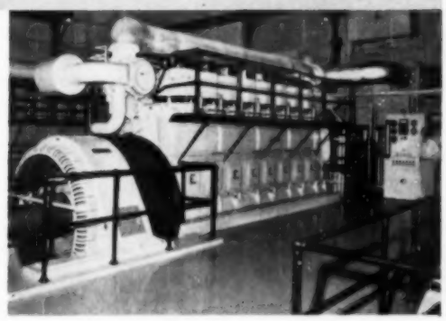
Early in 1957, New Smyrna Beach, Florida put two DSR-38 *Enterprise* Diesels into operation generating 90% of its power load. They burn about 100,000 gallons of #6 residual fuel every month. *Both engines have now run on 80% average load continuously for over a year and a half without shutdown except for normal maintenance—with fuel savings as high as $4200 per month!*

This performance is typical of *Enterprise* Diesels. For they are designed and built to permit the widest possible latitude in fuel use. You can now order your new engine fully equipped for burning residual fuels. Or your present *Enterprise* Diesel can be converted to handle heavy fuel by installing the necessary oil heaters and centrifuges. No change in the basic fuel injection system is required if it's an *Enterprise*.

To be sure your diesel will handle low cost fuels and still turn in maximum performance—*without expensive maintenance and downtime,* specify Enterprise—custom crafted by the engine people that have the heavy fuel experience—and know how to use it!



These two 2500 HP *Enterprise* Model DSR-38 Turbocharged Diesels have turned in record performance on heavy fuel operation. Simple *Enterprise* open-type combustion chamber design makes handling of heavy fuels easy and economical.

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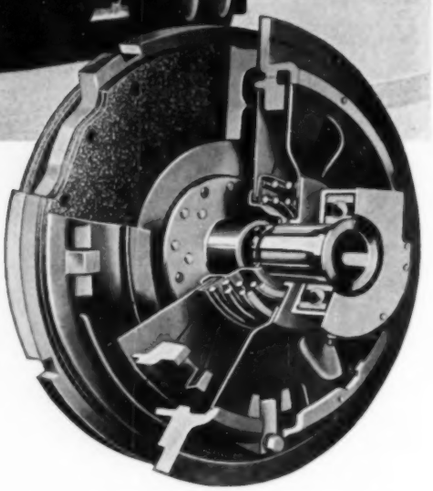
Pilot buys 110 new Diamond T's with trouble-free heavy-duty Spicer Clutches



Concentrating on giving its customers the best and most dependable service possible, Pilot Freight Carriers Inc. of Winston-Salem, N. C., insists that every consignment be routed, dispatched and shipped on time.

Naturally, dependability and maintenance-free service take top priority in the selection of equipment for the Pilot fleet. Explaining his choice of new equipment, T. D. Nicholas, Director of Operations for Pilot said this, "Our 110 new Diamond T diesels are virtually trouble-free. They're out on the road making money . . . not tied up in the shop. The Maintenance Superintendent tells me we've never owned trucks that were any easier to service." As you would expect, every one of these 110 new low-maintenance trucks is equipped with a Spicer 14" two-plate clutch.

Built to deliver 100,000 or more trouble-free miles, these Spicer clutches employ an anti-friction design that reduces pedal pressure at the same time it insures chatter-free operation in both forward or reverse. To insure longest wear, uniform pressure is maintained at all times by permanently parallel contact surfaces that resist cocking at any degree of wear. But best of all, pressure spring tension can be readjusted in minutes, by almost anyone, without the use of special tools.

For simplest maintenance and longest wear, do as Pilot does . . . specify Spicer Clutches for your fleet replacement program.

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Many of these products manufactured in Canada by Hayes Steel Products Limited, Merritton, Ontario.

MID-AMERICA'S M/V *ETTA KELCE*

RECENTLY built for the Mid-America Transportation Co. by St. Louis Shipbuilding & Steel Co., the new twin screw towboat *Etta Kelce* has entered service moving coal from mines on the Green River to Cincinnati. It is of special interest that the boat was named after, and christened by a most gracious lady, Mrs. Etta Kelce, on her 83rd birthday. Mrs. Kelce is the mother of the President, Merle C. Kelce, and Executive Vice-President, Ted L. Kelce of the Peabody Coal Co. Coal from the Peabody mines accounts for 95 per cent of the tonnage transported by Mid-America Transportation Co.

The *Etta Kelce* hull dimensions are 90 ft. x 26 ft. x 8 ft. 6 in. with a normal draft of 6 ft. The hull is heavily framed transversely and longitudinally, has a model scow bow and smooth flowing lines developed to provide a non-turbulent flow of water to the propellers. The vessel is classed A1 by the American Bureau of Shipping. Propulsion power is provided by two Fairbanks-Morse model 38F5¼M opposed-piston diesel engines, each 600 hp at 1200 rpm with Western Seamaster model 180-H, 4:1 ratio reverse reduction gears turning 74 in. dia. St. Louis Ship designed propellers. The engines are pilot house controlled with individual Westinghouse pneumatic systems. Two 40 kw General Motors diesel generator sets provide ample electric power. The switchboard is designed for individual generator control with panels for 220 and 110 volt distribution. Clear jacket-water for the propulsion and generator diesels is circulated through a closed type skin cooling system. St. Louis Ship hydraulic type steering systems are provided for the backing and steering rudders with mechanical follow-up controls. The main and auxiliary engine-room provide easy access to all units and are comfortably ventilated by blower and exhaust fans. Overhead trolleys, large double sliding doors, adequate floor space and a work bench are provided to facilitate repair work. The engine room is lined with sound absorbing acoustic material to minimize noise.

Auxiliaries provided include a 100 gpm fire and bilge pump, 50 gpm fuel oil transfer pump and two 14 cfm air compressors. All are driven by 220 volt, 3 phase motors. Two 15 ton hand winches and a 10 hp capstan are provided on the forward deck. A 2-ton capacity Kingpost Derrick is furnished to handle the vessel's workboat and to aid rudder and propeller installation. The deckhouse is arranged with galley and mess, crew's quarters and lounge on the main deck, and officers' quarters on the second deck. Interiors are lined with masonite, fully insulated, and are decorated in pastel green with attractively colored curtains and modernistic furniture. Living quarters, mess, lounge and pilot-house are air-conditioned. Yorkaire "Snorkel type" cooling units fitted with circulating hot water coils allow individual comfort control.

Engine room with one of the two Fairbanks-Morse 600 hp engines foreground and in rear, one of the two GM diesels that drive 40 kw Delco generators.

Officials of Southern-Plaza look over one of the first of their new Kenworths. From left are Fielding Childress, president; Tom Collins, vice president maintenance, and George Busso, superintendent of maintenance, Eastern division.

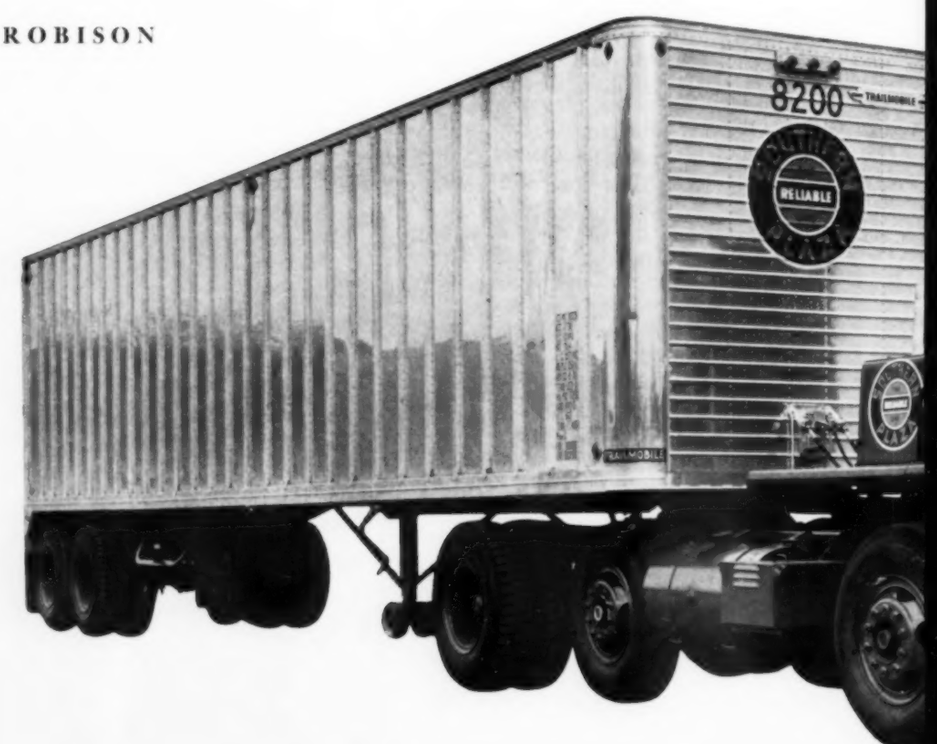
SOUTHERN-PLAZA EXPRESS GOES ULTRA MODERN

By DWIGHT P. ROBISON

SOUTHERN-Plaza Express, Inc. replaces gasoline line haul equipment with diesels and replaces its entire trailer fleet 100 per cent with new 40 footers. Progress! The very nerve center of the trucking industry manifests itself here in some of the most modern, far-reaching, up-to-date diesel equipment on the highways of America today. The new fleet of 74 Kenworth tractors is powered by the Cummins NT-180 turbocharged diesel engine which develops 180 hp at 2000 rpm and 500 ft. lbs. of torque at 1500 rpm with a displacement of 496 cu. ins. The high sustained torque output of this engine is capably handled by a Spicer 14 in. 2 plate clutch with needle bearing inclusions. This clutch is part and parcel to the new Spicer Syncromaster 12-speed transmission which is entirely synchronized throughout its entire 12 speeds. It contains its own oil pump and filter assembly for properly lubricating all of the anti-friction bearings contained therein. It is housed in an aluminum case for more payload and better life characteristics. The rear axle is a Timken model R14OP of 4.625 ratio, single reduction, bypoid.

Coupled to the foregoing is the new Cummins Cruisemaster governor. Considering that the Spicer Synchromaster is direct on 11th and has a .80 overdrive in 12th speed, here was an opportunity to get two necessary functions covered at one time. First, Southern-Plaza Express wanted a maximum of 52 mph at 2000 rpm. This was obtained in 11th gear by the proper selection of axle ratio and provided all the benefits of full throttle, full power at 52 mph. Second, Southern-Plaza Express wanted a cruise gear at the same speed with reduced power and reduced engine rpm's for the time of the fair grade, or flat ground, or possibly the bulky load. The Cummins governor used with the 8125 Spicer provided 52 mph at 1600 rpm. This combination reduces rpm's between points, thereby reducing fuel usage proportionately and still keeps the fleet operating at schedule requirements.

The 74 Kenworth tractors comprising this group are model T522 Cab Beside Engine, single tired pushers. They are of the new configuration embodying the flat deck on the right side with fiberglas nose section, four headlights, recessed road lights and the Donaldson oil bath air cleaner mounted at the forward corner for the coolest possible air pick-up. The radiators are tube and fin type with bolted aluminum tanks, top and



bottom, and the water temperature is controlled by Kysor all-aluminum shutters.

The FTO-28 suspension places the trailing axle in front of the drive axle, resulting in a short wheelbase of 150 ins. for the three-axle trucks. The overslung four-spring construction distributes loading over the frame at six points, with a 66-34 per cent distribution. As there is almost no weight transfer between axles, "bogey hopping" is eliminated, light or loaded. A considerable weight saving is achieved and riding qualities are the best obtainable. Interested, too, in continuing their company's outstanding safety record, the executives of Southern-Plaza Express considered the visibility and driver-comfort features of the Kenworth CBE. This cab, which is one-man wide, was designed for unlimited visibility, with narrow corner posts, deep windows, and the driver ideally seated in a high off-center position. Perfected ventilation and fresh air heating keep the driver cool in summer, warm in winter. The insulated, rubber-mounted cab is entirely separate from the engine, and all engine heat is vented to the rear and right side, completely away from the cab.

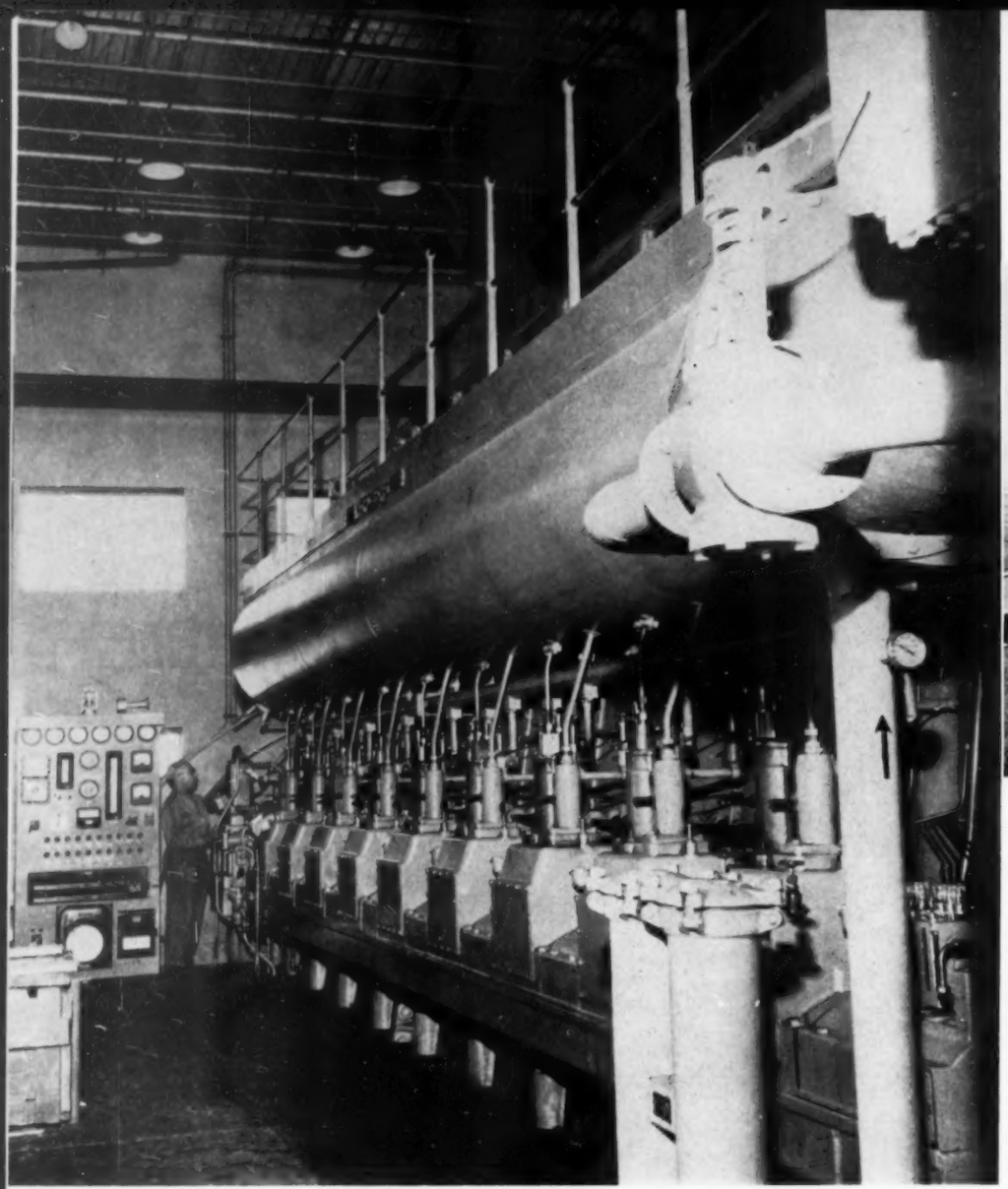
Jim Emmerson, superintendent of maintenance, Western division of Southern-Plaza checks over the new 180 hp Cummins diesel, a turbo-charged four cylinder version of the NH-220 engine. Perry water filter is installed in lube oil system.

In addition, the entire trailer fleet is being replaced by 336 new model C64S Trailmobile trailers. They are 40 ft. overall with low-level, straight side rails and exterior post type construction. They have 36 in. king pin setting, tandem setting to extreme rear, basket type tire carrier and sand shoes instead of wheels on the landing gear. Axles are Timken TK570 with 16½ x 7 in. brakes.

Among the finest diesel highway equipment available, this Kenworth CBE tractor is powered with a Cummins NT-180 engine with Spicer clutch and 12 speed transmission. Note Donaldson oil bath air cleaner and Kysor radiator shutters.

Lights include the maximum consideration for safety, plus the anticipated requirements of the new I.C.C. regulations soon to be released. The entire fleet will be delivered on Budd wheels. Goodyear, Goodrich and General tires will be 10:00 x 20 tube-type, nylon cord. All front, pushers and trailer tires will be ½ tread and all drive tires will be high tread lug type. Every wheel bearing in the entire fleet will be oil lubricated on S.A.E. 90 straight mineral oil, and this will be retained by Stemco oil seals. The bearings of the front wheels and the pusher wheels are further protected by the use of micro-nuts enabling a positive setting on the bearing load for these spindles, reducing the "feel" and the unknowns from bearing adjustment.

Famed for its "Fast-On-Land-Service", Southern-Plaza Express, with headquarters in Dallas, Texas, operates throughout the Southwest and to Kansas City, St. Louis, Chicago and Memphis, with connections throughout the nation. It has been serving industry since the early thirties. Dallas, is one of fifteen major company owned and operated terminals as visually depicted on this page.



Utilities Manager Vern Livingston at the Woodward governor of the new Nordberg 4350 hp engine. Note American Bosch fuel pumps, Manzel lubricators, and Nugent filters in foreground.

DIESEL WORK-HORSE FOR NEBRASKA CITY

By KEITH N. NEWHOUSE*

A NEW 4,350 hp Nordberg Duafuel engine has become the work-horse of the Nebraska City municipal diesel plant. In the six months after the unit went into full service in July 1958, it was on the line 86.5 per cent of the time and produced 59.6 per cent of the plant's total output. Both its size and very low heat rate won this important role for the plant's largest engine.

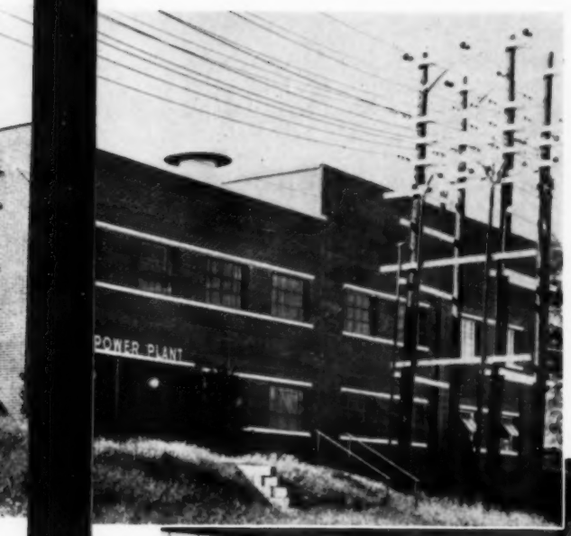
Mr. Vern Livingston, manager of the Nebraska City Utlities, under the supervision of the Board of Public Works, has established an enviable record of good utility operation. His goal has been to provide dependable, adequate, and economical service. That this goal is being achieved is obvious. No customer waiting lists are needed. Rates are comparable to those of cities of similar size. Service interruptions or curtailments are very rare. Casual conversation with the citizens they serve indicates a high degree of customer satisfaction. The utilities system consists of the natural gas, water, and electric services with total assets today of $6,870,140. First facilities acquired were the gas and water distribution systems in 1941. Four years later, it was voted to purchase the electric system in Nebraska City and surrounding communities. First move was to cut electric rates 20 per cent to all residential customers. This alone has resulted in direct savings of $421,264 to the customers in the intervening time. The city's acquired power sources consisted of a 2500 kw, 165 lb. steam generating plant and a 2000 kw tie with a public power district. Early engineering studies clearly indicated the desirablity of diesel generating units due to their operating flexibility and high efficiency in the sizes needed.

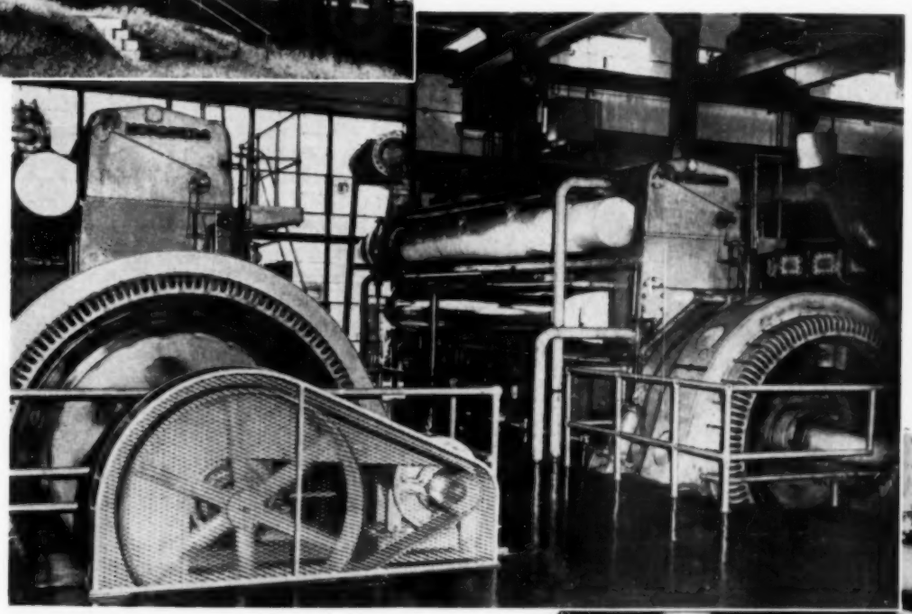
First prime movers installed in implementation of the development program were two Nordberg Supairthermal Duafuel diesels. These four-cycle units, which went into service in 1952 and 1953, are rated 2120 hp each at 327 rpm. Each drives a 1500 kw generator. These were followed in 1955 by a 3500 hp dual-fuel engine with 2500 kw generator. Continued rapid load expansion together with a policy of reducing dependence on relatively expensive steam and purchased power led to the installation of Nebraska City's newest and largest diesel. This model TSGL-219 Nordberg Duafuel is a two-cycle engine with nine cylinders, 21½ in. bore and 31 in. stroke. It operates at 4350 hp at 240 rpm and drives a 3525 kw GE generator. When assigned to full-time service in July, 1958, the big engine really shouldered the load. In six months the unit was on the line for 3,721.4 hrs., 86.5 per cent of the elapsed time. The engine generated 8,134,900 kwhs of the plant's production of 13,670,700 kwhs, 59.6 per cent of the total. Actually the new diesel was just warming to its job.

The steam plant was relegated to standby status and purchased power was reduced to a trickle. The economics of the situation were clear. Costs of steam generation in the past ten years were never under 7.11 mills per kwh and were rising. Cost of purchased power in the same decade was never under 8.53 mills and has risen to more than 15 mills. The gas-burning diesels, meanwhile, had cut total generation costs to the level of 4.89 mills per kwh for the first 11 months of 1958. The new engine, for example, consumed just 50,935 gal. of pilot oil and 83,921 mcf of natural gas in producing its 8,134,900 kwhs, an average of 0.00626 gal. of oil and 10.31 cu. ft. of gas per kwh. These figures include two days of full operation on oil, so pilot fuel consumption normally is somewhat lower. Operating superintendent Ray Hall is expecting

*Associate Professor, Mechanical Engineering, University of Nebraska

First two sections of Power Plant housing four units. Expansion to north (right) will accommodate two more units.





2120 hp Nordberg Supairthermal Duafuel diesels installed in 1952-1953.

350 hp motor driven Roots-Connersville blower, Fulton-Sylphon temperature regulating valve and Nugent filters serving new Nordberg engine.

great things of the new 9 cylinder, two cycle, 4350 hp unit. Pilot fuel oil has averaged about 6 per cent of that for full fuel oil operation during the initial break-in period. This is expected to drop somewhat as operating hours increase. Lube oil consumption is running about 6,313 hp/hrs./gal. Around 30,000 hrs. operating time is anticipated between major overhauls on this gas burning engine. The heat rate is consistently falling below 10,200 Btu per kwh. The new unit is really the "work horse" of the plant.

The engine can be operated on either diesel fuel or natural gas, or on any combination. A minimum fuel oil usage is desired because local fuel costs definitely favor natural gas. Only the small amount of oil necessary to trigger the gas ignition is used except on starting and stopping. Natural gas is supplied to the engine at 20 psi. after passing through a scrubber, a meter, and a pressure reducing station from the 100 lb. line pressure. In event of a gas failure, the engine will automatically shift over to fuel oil operation.

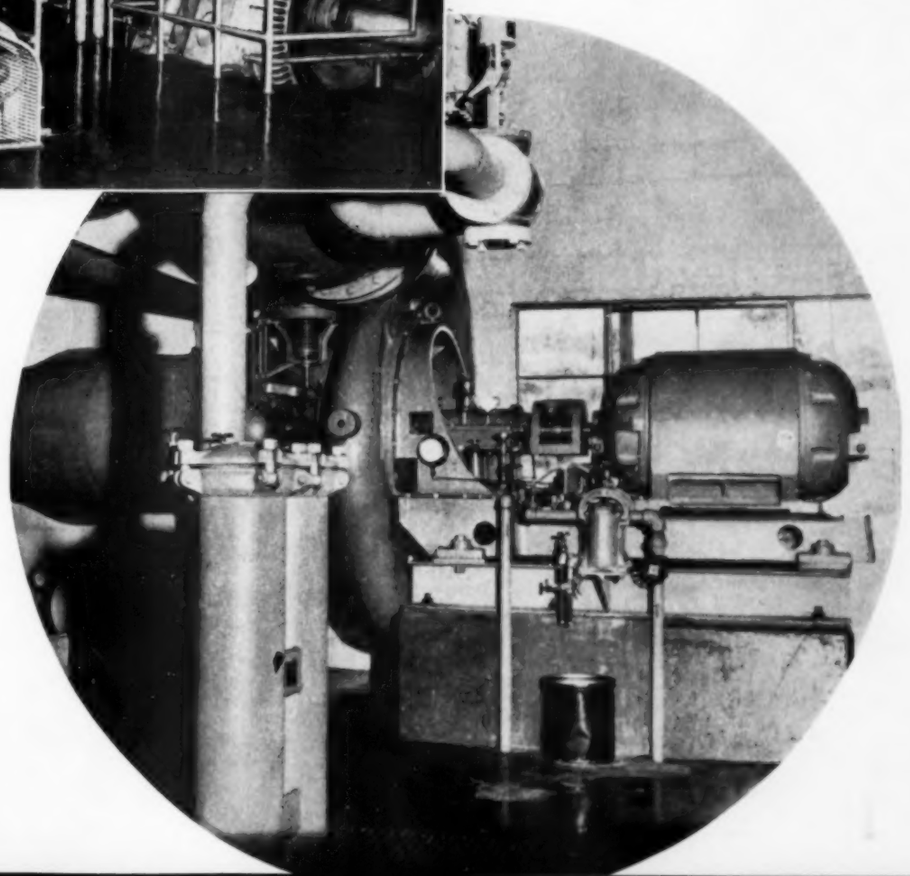
Wood induced-draft cooling towers are used for engine cooling. The Missouri river flows by only a few hundred feet away but the operating difficulties encountered with sand bars, contamination, and variable temperature made it undesirable as a cooling source. Chemically treated engine jacket water is circulated in a closed loop and is cooled in a heat exchanger by the tower water. Both tower and jacket water make-up is treated by a sodium zeolite type softener. The lube oil is cooled from 140°F to 120°F by rejecting heat to the tower water. From the cooler the detergent type lubricating oil is pumped through a strainer to the engine crankcase with a portion bypassed continually through the lube oil filters. The same detergent oil is used in the cylinder lubricators which inject the oil to 6 places in each cylinder.

Electric power at 4160 volts is delivered through unitized metal clad switchgear to the 13.2 kv distribution substation. Plant auxiliary power is at 220.440 volts with the scavenging air blower motor supplied at 4160 volts.

Like most utilities, Nebraska City's electric system has experienced impressive growth. Peak load in 1940 was 1955 kw, in 1952 it was up to 4550 kw, and in 1958 zoomed to 7200 kw. This last figure represents the summer peak, built by air conditioning and refrigeration load. It would have been higher still had not abundant rainfall reduced the normal irrigation pumping demand. The previous winter peak was 5400 kw and Livingston is seeking to fill this valley by promoting electric space heating and heat pumps. The city's progressive management anticipates that load will again double in the next ten years. The north wall is built of removable steel panels and, in planning the latest engine installation, the consulting engineers, Stanley Engineering Company of Muscatine, Ia., allowed ample room for expansion.

Principal Equipment Serving New Nordberg Engine

Engine	Nordberg
Alternator & Exciter	General Electric
Blower	Roots Connersville
Governor	Woodward
Fuel filter	Wm. W. Nugent
Lubricators	Manzel
Injectors	American Bosch
Oil Cooler	Ross
Oil filter	Commercial
Air filter	American
Muffler	Burgess-Manning
Jacket water cooler	Ross
Pyrometer	Alnor
Lube oil	Texaco HD-40
Temperature regulating valve	Fulton-Sylphon



LOGGING IN CANADIAN NORTHWEST

By DOUGLAS SHEARING

PAUL Bunyan, that legendary giant who could do the work of a thousand men, would stare in disbelief at the daily results of a single man in this machine age. And, when the work is heavy and tough, a diesel engine is usually providing the power for the man-controlled machines. A user of large amounts of diesels in British Columbia is Canadian Forest Products Ltd., a widespread organization engaged in both logging and manufacturing phases of a closely integrated forest industry. Established in 1938, the company has grown to include 10 divisions and associated companies. The payroll has grown from 28 people employed in a small furniture factory to over 3700 employees today. Capital expenditures increasing the efficiency of production facilities have amounted to more than $50 million since the inception of the company. One of the largest units in which millions of dollars has been invested as capital expenditures and which produces 160 million bd. ft. of logs annually is the Englewood Logging Division. Over 700 employees are engaged in this division. Timber operations are located in the Nimpkish Valley on the northern part of Vancouver Island. This division along with three others located in two other sections of British Columbia supply the bulk of the logs required for continuous operation of the manufacturing divisions. Further requirements are bought on the open market. The Nimpkish Valley is one of the outstanding timber valleys on Vancouver Island, containing extensive forests of Douglas fir, red cedar, hemlock, balsam, spruce, white pine and yellow cedar. The valley is ideally suited to Douglas fir growth. The tallest tree measured to date in Canada was a 305 ft. fir tree which was felled near the Davie River, a main tributary of the Nimpkish River, a few years ago. This tree was 390 years old.

The first large scale logging operation in the Nimpkish Valley commenced in 1917, when the Wood and English Logging Co. opened up their railroad operation. This company operated for 24 years until 1941. During this time, the logs were dumped in the lake, towed to the north end and then re-loaded on railway cars, as was the practice of Canadian Forest Products Ltd. until 1957. In June 1957, the Nimpkish Lake to Beaver Cove railway extension was officially opened. Construction commenced in May, 1955 and was completed in the Spring of 1957. It required the blasting of 351,000 cu. yds. of rock and the additional excavation of 364,000 cu. yds. of other materials. Nine major bridges covering a total length of 3,430 ft. were constructed. Four of these bridges range in height from 101 to 148 ft. Canadian Forest Products Ltd. commenced logging operations at Nimpkish in 1942 and have built roads and logging communities of a permanent kind. The improvement in the transportation system, of which the Beaver Cove railway extension is part, fits into the long term plans to manage the Nimpkish Valley on a permanent sustained yield basis. Other phases of this plan include protection of the forest from fire, prompt restocking of all logged areas and improvement of all phases of utilization.

In March 1956, Canadian Forest Products Ltd. in accordance with its modernization program placed in service two 1200 hp diesel electric locomotives built by General Motors Diesel Ltd., London, Ontario. The locomotives are operating in the Nimpkish Valley where the logging operation is being converted to a "truck feeder" system. All the logs hauled by truck are hauled to transfer points on the railroad where they are reloaded on railway cars. This method combines the flexibility of trucks with the economy of long hauls by railroad. The system makes it possible to reach large stands of timber previously inaccessible because of low quality or location on difficult terrain. Previously, about two-thirds of the logs have been produced by direct railroad logging operations, where the logs are "yarded" from the stump direct to the railroad car. The remaining logs were being hauled by truck from Camp A to Nimpkish Lake. The truck operation has been converted to a haul to the railroad only. The trains are then made up and hauled by the GM iocomotives to Beaver Cove for unloading. The logs are then towed 200

"Going to work" for these two General Motors, Diesel locomotives was even more difficult than that of a harassed rush-hour driver in heavy traffic. The 1200 hp units are being transported to Vancouver Island by barge. The towing boat, the *Tuggar Yorke*, is also GM diesel powered.

Hauling a train of logs to Beaver Cove, diesel unit 301 owned by Canadian Forest Products Ltd., is surrounded by scenic splendor. The locomotive is climbing a ruling grade of .70 per cent.

Locomotive 301, crossing one of the nine major bridges on the new 23 mile railway extension of Canadian Forest Products Ltd., hauls a loaded train to Beaver Cove. Note the empty flat car required because of the length of many of the logs.

wards Beaver Cove encounters a ruling grade of approximately .70 per cent, the empty train towards Nimpkish encounters a ruling grade of 2.20 per cent. On a typical run, one of the diesel locomotives will be hauling 32 loaded cars for a total tonnage of approximately 1400 tons, of which 800 tons, equivalent to 200,000 bd. ft., are logs and 600 tons the weight of the cars. Approximately 13 empty cars are included in the train to accommodate the overhang of logs which are longer than the car on which they are loaded. Speed on the ruling grade to Beaver Cove is approximately 11 mph. In addition to performing a great deal more work than 10 stem locomotives also in service, the diesel units produce high savings in operating and maintenance costs. The General Motors units operate 16 to 20 hrs./day at an approximate cost of $17.00/hr. which includes operating and repair and maintenance costs, or, $13.75/hr. for operating costs alone.

miles in booms to the company's conversion plants in the Vancouver area where pulp, lumber, plywood, shingles and hardboard are manufactured. Twenty-five hundred men are employed in the manufacturing divisions of the firm.

As a dual truck-railroad logging operation, the division has 85 miles of truck roads, 63 miles of mainline railway and 110 miles of spur lines. The new 23-mile stretch of railroad was constructed to bypass the expensive Nimpkish Lake tug haul with its attendant unloading and loading operations at Nimpkish and Camp L. The new line begins at Nimpkish and terminates at Beaver Cove and has been constructed as a balanced line to take full advantage of diesel electric motive power. Grades are such that while the loaded train to-

Diesel engines powering other equipment in woods operations also result in big savings and enable one of Canada's prime industries to provide their products to the consuming public at lower prices. When one watches powerful locomotives pulling a train of logs, great tractors cutting new roads through the forest, one wonders what our lives would be like without these marvelous mechanical muscles. Not many years ago, men could only dream of a Paul Bunyan, an imaginary giant who could log a whole forest in a single day. Today, men no longer have to dream of a Paul Bunyan. Today, they have his successor in reality—modern diesel engines.

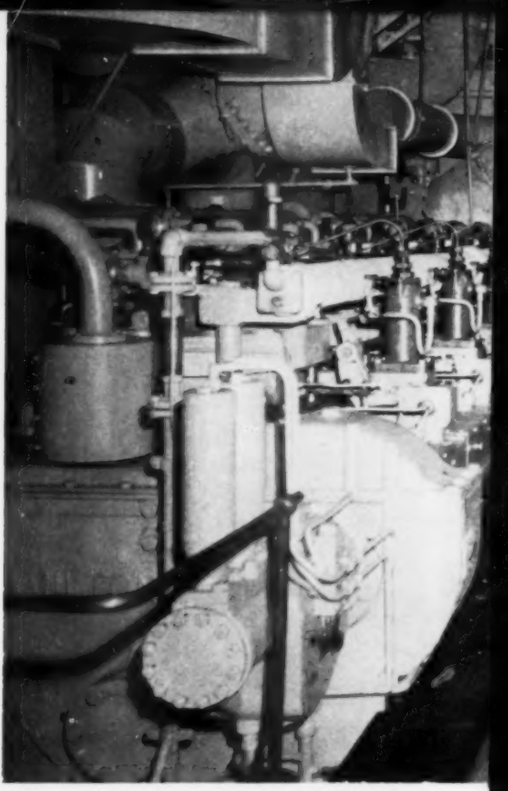
M/V *THOMAS NELSON* SETS FUEL ECONOMY MARK

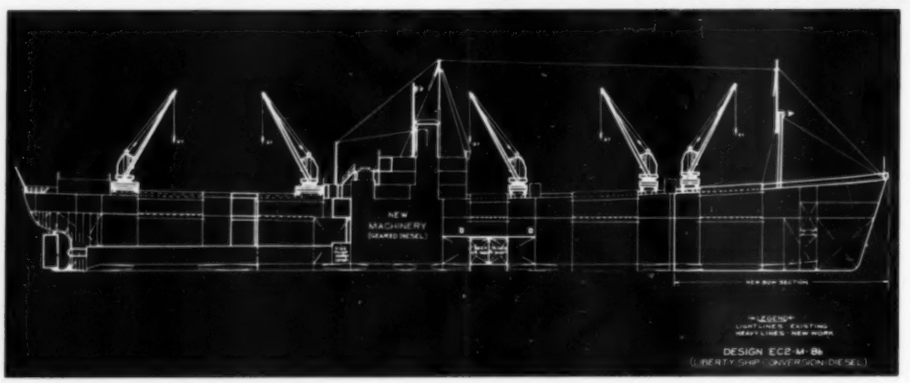
Two 3125 HP Baldwin-Lima-Hamilton Diesels Powering Converted Liberty Ship Log 6647 Hours Since Recommissioning with Fuel Consumption of .417 Lbs./SHP

By DOUGLAS SHEARING

RECORD fuel economy has been exhibited by the diesel propelled M/V *Thomas Nelson*, converted World War II Liberty Ship, during 92,000 miles of service since her recommissioning in 1956. Excellent maneuverability and a 17.5-knot top speed—exceeding Maritime Commission requirements for Liberty ship conversions—also has been demonstrated by the *Nelson* during more than 20 Atlantic crossings. One of four converted Liberties under an experiemental modernization program established by the Maritime Commission to replace original steam-engine propulsion plants, the *Nelson* was turned over to U. S. Lines, after commissioning, for regular cargo-service duty. Her ports of call now range from the United States east coast—from Jacksonville, Fla., to Baltimore, Md.—to major parts of northern Europe. Because of her outstanding performance over the past two years, the *Nelson* has been chartered by U. S. Lines for an additional two-year period for further cargo service in the Atlantic.

Since the *Nelson* was recommissioned, a total of 6647 hrs. has been logged on the main engines—twin 3125 hp diesels built by Hamilton Division, Hamilton, O., of Baldwin-Lima-Hamilton Corp. Outstanding performance of these engines has been marked by a record low rate of fuel consumption—a rate ranging from 16 to 47 per cent lower than those of the other three experimental conversions. The propulsion systems of the other vessels are steam turbine, gas turbine and free-piston. Overall plant efficiency of the *Nelson* is 30 per cent, based on net heat input and net power output. Net heat is based on the content of Bunker "C" fuel oil in "as received" condition, metered ahead of purifiers. Net shaft horsepower is measured by a torsion meter on the propeller shaft. Underway, the *Nelson's* average fuel consumption for ten voyages was 5.55 bbl./hr. at an average speed of 14.9 knots —0.42 bbl./mile. Average lube oil consumption is 42 gpd, including 25 gpd of crankcase oil and 17 gpd of cylinder oil. Seven gallons per day for auxiliary machinery is included in the 42 gpd figure.

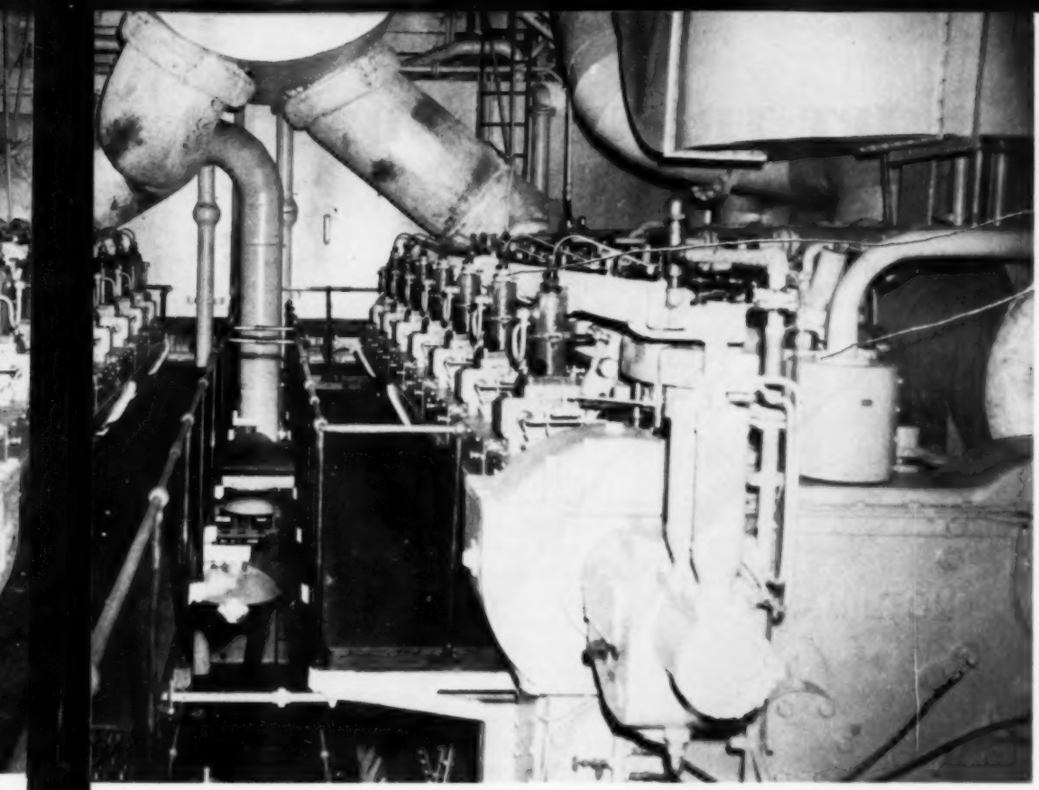




Inboard profile of the *Thomas Nelson*. During conversion she was lengthened from 416 to 441 ft. Her horsepower was increased from 2500 to 6250.

M/V *Thomas Nelson*, powered by twin 3125-horsepower Hamilton diesel engines driving through Westinghouse gears and couplings, has demonstrated record fuel economy during more than 92,000 miles of service including 20 Atlantic crossings.

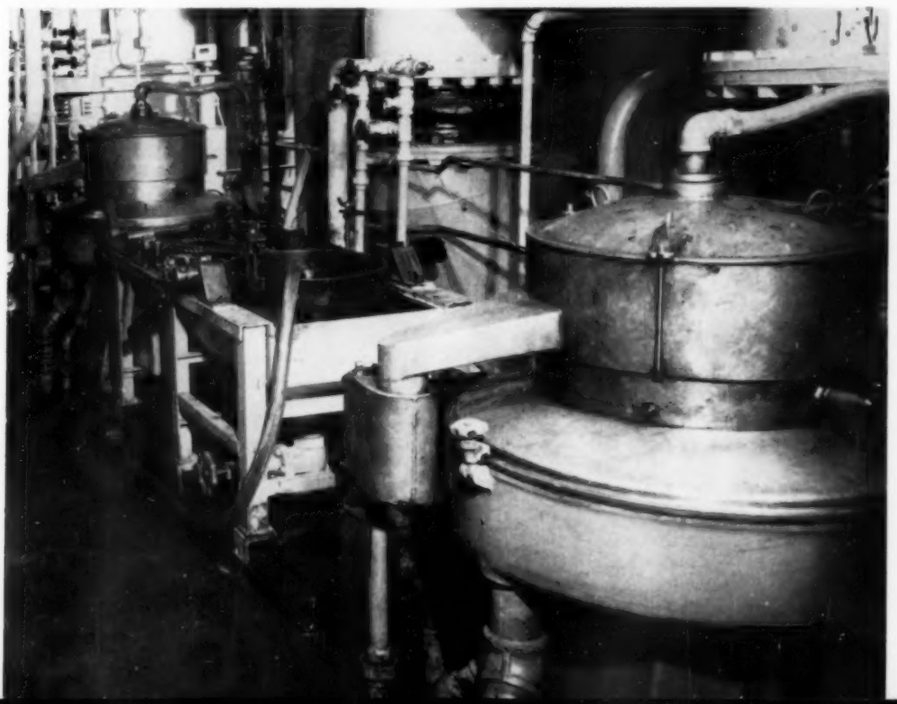
The BLH engines, which have a 21½ in. bore and 27½ in. stroke, are directly reversible. They drive through Westinghouse electric couplings and twin pinion reduction gear with a common bull gear to a single propeller shaft. Operating on two-stroke cycle, scavenging air for the engines is supplied



Upper engine room looking forward, shows tops of the two Baldwin-Lima-Hamilton propulsion engines with individual American Bosch fuel injection pumps for each cylinder. The exhaust pipes lead into a single Foster-Wheeler waste heat steam generator.

by attached Roots-Connersville positive displacement blowers. Sufficient air is entrapped in the cylinders, by a timed rotary exhaust valve, to afford proper combustion of Bunker "C" fuel oil. The engines also are equipped with air starting and reversing which, along with dual controls and electric couplings, afford extremely fast maneuvering and overall ease of handling that is so essential in harbor areas. The auxiliary diesels are a pair of 6 cylinder General Motors units directly connected to two 300 kw Westinghouse 120/240 volt dc generators. The main switchboards and the various power panels including those for the electro-magnetic couplings on the main engines are all Westinghouse. For a more complete description of the main and auxiliary engines see the November 1956 issue of DIESEL PROGRESS.

Bunker "C" fuel oil is transferred from storage bunkers to heated settling tanks, then pumped through primary heaters and purified by two centrifuges in series—using a slurry type of auto-desludging. This produces a clean fuel, free of non-combustibles, water and particles which could impede fuel flow through the injection equipment. Fuel is stored in a heated day tank, then pumped from there through thermostatically controlled heaters, filters and strainers to the main engine header. Fuel which is not burned immediately is returned to the day tank by the continuous-flow circulation system. This continuous, high-speed circulation of fuel through the header and injection equipment assures a constant temperature and correct viscosity for the particular fuel used. Initial control of fuel temperature and viscosity is vital because of the wide variations in characteristics of residual fuels purchased in different ports. On the *Nelson*, this consists of thermostatic control of steam to heaters and constant viscosity checking through use of a viscorator system. The result is a fuel which will atomize and mix properly in the combustion chamber for complete burning. Heat used in all fuel heaters and other services is furnished by steam from waste heat boilers when the ship is underway. In port, or during maneuvering, a donkey boiler is used.



Specific fuel consumption figures for the four converted experimental ships were obtained by converting actual fuel burned in the various propulsion units to a common base, using the Diesel Engine Manufacturers Association (DEMA) standard of 19,350 B.T.U./lb. HHV for fuel oil. Fuel consumption figures were obtained during Maritime Commission sea trial test burnings. A comparison of the four experimental conversions shows that specific fuel consumption of the *Nelson's* diesel engines is less than that of any of the other three—ranging from 16 to 47 per cent less.

Vessel	Specific Fuel Consumption At Full Rated Speed And Power (lbs/shp)	Propulsion System
MV *Thomas Nelson*	.417	Two directly reversible marine diesels with electric couplings and reduction gear
GTV *William Patterson*	.494	Six free-piston gasifiers with two reversible gas turbines and reduction gear
GTV *John Sergeant*	.505	Straight, non-reversing open-cycle gas turbine with single pinion double-reduction gear and variable-pitch propeller
SS *Benjamin Chew*	.787	Oil-fired boilers with geared steam turbine plus ahead and astern maneuvering valves

List of Principal Equipment

Main engines	Baldwin-Lima-Hamilton
Electric couplings and reduction gears	Westinghouse
Fuel injection pumps	American Bosch
Governor	Woodward
Exhaust pyrometer	Alnor
Heavy fuel centrifuges	Sharples
Scavenging air blowers	Roots-Connersville
Auxiliary engines	General Motors
Auxiliary generators	Westinghouse

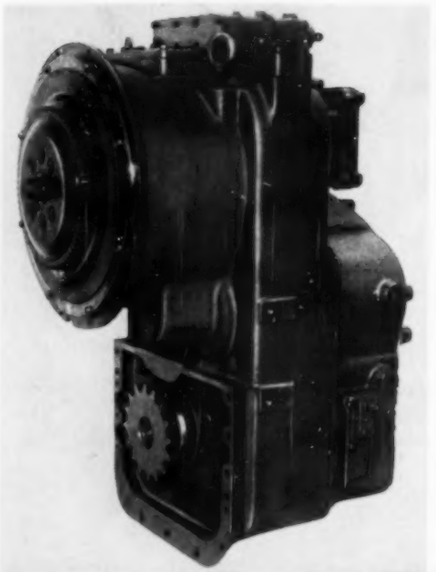
Two Sharples self-cleaning residual fuel oil purifiers. Known as Recycle Nozljectors, these high capacity centrifuges remove water, carboids, and sludge from the oil. They operate singly, one being kept for standby service.

NEW POWER-SHIFT TRANSMISSIONS AND TORQUE CONVERTER

By JIM BROWN

TWO full-power-shift transmissions and a single stage, three-element torque converter have recently been added to its varied line of transmission elements for heavy-duty construction, road building and materials handling equipment by the Transmission and Axle Division of Rockwell-Standard Corporation. The two, four-speed Hydra-Drive transmissions are somewhat different in design and capacity, the CDB model having a capacity of 275 max. hp input and the newer BDB model having a maximum input capacity of 175 hp. The new torque converter is available either as (1) a separate unit, (2) in conjunction with an air-operated clutch to be used with any adequate transmission or (3) in conjunction with either of the two power-shift transmissions.

The CDB Hydra-Drives transmission is designed for use with a 13, 14 or 15 in. Hydra-Drives torque converter, for a maximum torque input of 550 ft./lbs., and for a maximum input speed of 2600 rpm. Both the CDB and the BDB Hydra-Drives transmissions provide four speeds forward and reverse. The CDB transmission provides low range gear ratios of 6.85 to 1 and 3.43 to 1, and high range gear ratios of 2.14 to 1 and 1.07 to 1, both forward and reverse. The "heart" of all Hydra-Drives transmissions is the relatively simple clutch assembly shown in Figure 1. This assembly receives its power through an inner shaft which rotates two centrally-located, spring-loaded hydraulically actuated pistons. One or the other of the pistons (never both) is forced by pressurized hydraulic fluid against a clutch pack which in turn transmits the torque to a gear located outside of the clutch pack. By mounting different-size gears at either end of the clutch assembly and "stacking" two or more of the assemblies it becomes obvious that different ratios of gear drive can be obtained through gears that are constantly in mesh. Actually the gears are not shifted to obtain two different degrees of gear reduction from one clutch assembly; the only shifting necessary is the hydraulic engagement of one or the other of the clutch packs. The CDB Hydra-Drives transmission consists of two of these clutch assemblies mounted adjacent to each other with an idler gear between them at the front end. The idler gear has the effect of reversing the direction or rotation, so when it is brought into play by means of the clutch pack, the vehicle is put into reverse. Thus one clutch assembly serves as a reversing mechanism; the other provides two forward speeds to the output shaft assembly. On the output shaft assembly a cluster gear is shifted backwards or forwards in the conventional manner



Front ¾ view of CDB Transmission. Note provision for front drive-line.

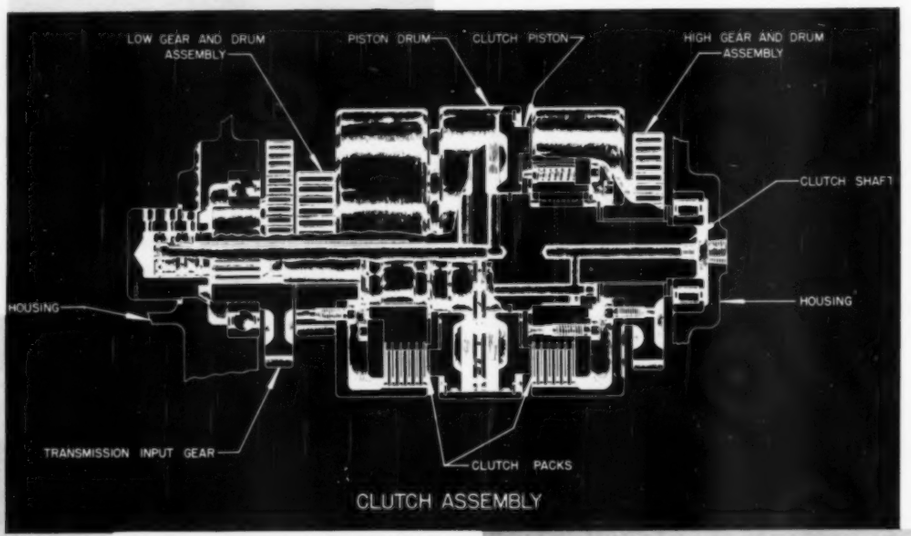
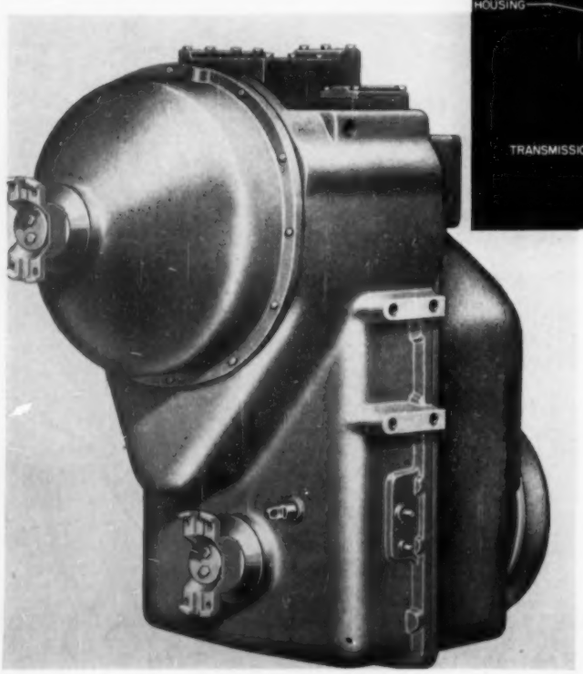


Figure 1. Cutaway line drawing of clutch assembly, the hydraulic gear-shifting mechanism in Rockwell-Standard CDB and BDB Transmission.



The new Rockwell-Standard BDB full-power-shift transmission.

A Rockwell-Standard Power-Shift Transmission is used in this Huber-Warco 7-D Motor Grader.

to engage mating gears and provide a high range or a low range. The result is to provide two speeds in the high range and two speeds in the low range, forward or reverse. The "range" shift in this transmission must be done while at a stand-still, but shifting between one speed and another within each range can be done while underway and under load. Forward to reverse shifting also can be accomplished under full engine power, making it possible to easily and effectively "rock" a vehicle.

The BDB model Hydra-Drives transmission operates on the same general design principles as the CDB except that it has the additional desirable feature of being a full-power-shift transmission. This gives the operator a choice of four gears and he can shift from one to the other at will without stopping the vehicle. The BDB transmission was designed for use with 11, 12, 13 and 14 in. diameter Hydra-Drives converters, a maximum of 175 input horsepower and a maximum input speed of 3400 rpm. The full-power-shift feature in the new BDB transmissions was obtained by substituting a third clutch assembly for the sliding gear assembly on the output shaft used in the CDB transmission. In this design one of the clutch assemblies serves as a reversing assembly; another provides two gear ratios and the third provides two more. All of the gears are constantly in mesh and each is operated independently of the other gear in its particular clutch assembly. All of the shifting is done hydraulically. Basically two small controls (a forward-reverse lever and a gear selector lever) are all that are needed to route the hydraulic pressure to the proper gear pack and it is impossible to be in more than one gear at a time. This transmission is well suited for loaders, graders, tractors, fork-lifts and other vehicles whose operation requires frequent directional changes under greatly varying load conditions.

Rockwell-Standard transmissions can also be provided with a third (optional) control called the inching control which reduces the oil pressure actuating the clutch packs and allows the vehicle to be inched forward or in reverse under conditions when even the lowest speed might not be desirable. A typical application in which such a control is advantageous is in fork-lift trucks which often require inching into better position for loading. In designing the Hydra-Drives transmissions the Rockwell-Standard engineers provided optional output speed governor drives and speedometer drives and a conveniently located, full-engine-power hydraulic pump drive adequate to handle the heavy hydraulic requirements of front-end loaders, fork-lift trucks, tractors, dumpers, etc. They also have provided for power take-off at either end of the output shaft for four-wheel drive vehicles, with an optional front-drive disconnect. Another option is a parking brake.

Hydra-Drives transmissions may be mounted by the equipment manufacturer either directly behind the engine or in a remote location. They are compact while maintaining a 20 in. drop center between input and output shafts. According to Rockwell-Standard, shorter transmissions result in better drive-line angles and allow more space for the installation of rear-engine torsional vibration dampeners where they may be required.

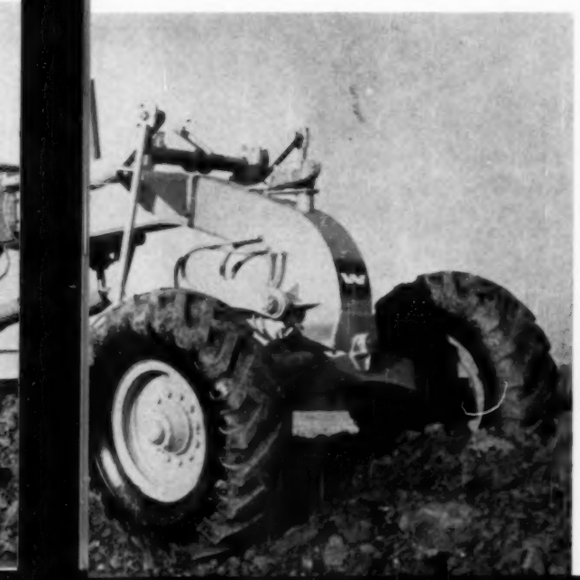
The Hydra-Drives torque converter is a single stage, 3-element converter consisting of pump, turbine and reaction member, shafts, housing, bearings and oil pressure pump. It develops a stall torque ratio of 3 to 1. The reaction member is mounted centrally between the pump and turbine. The hydraulic fluid (which can be ordinary motor oil) is driven off the blades of the pump against those of the turbine. From the turbine it flows through the blades of the reaction member and is re-directed into the blades of the pump, thereby providing an increase in torque. In the "F" or freewheeling models, the reaction member remains stationary and serves to multiply the torque until a predetermined speed is attained by the output shaft. At this point the force and direction of the driven oil strikes the reaction member in such fashion as to cause it to turn until its speed approximates that of the pump and turbine. In this phase it is said to be free-wheeling and the converter becomes essentially a fluid coupling, with a gain in overall efficiency at high output shaft speeds. To keep the free-wheeling reaction member or stator from turning in the wrong direction in the Hydra-Drives torque converters it is mounted on a simple but effective sprag pak consisting of a number of hardened steel rectilinear pieces. The sprags are so shaped as to allow them to lean in the forward direction but in the reverse direction their diagonal dimensions cause them to lock the stator in place.

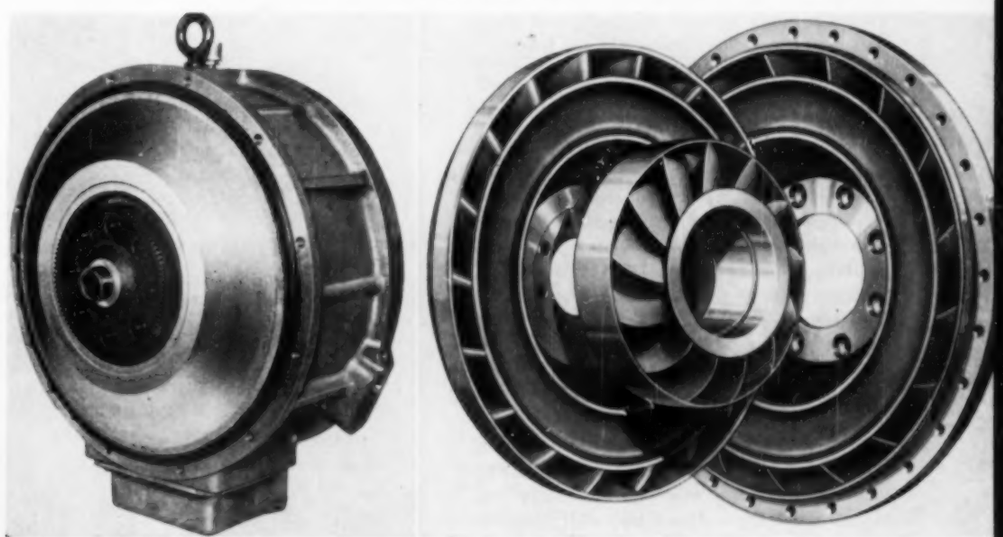
Since many kinds of heavy equipment seldom attain sufficient speed to take advantage of the fluid coupling phase of converter performance, Rockwell-Standard also markets its converters in another type, without the free-wheeling feature. In these converters the reaction member is held firmly stationary by a spline mounting which is installed in place of the "sprag pak" mounting. This lowers the cost of manufacture and, in some instances, simplifies construction and maintenance without any loss of value to the user. These are believed to be the only torque converters in production which offer the option of free-wheeling or fixed reaction members; most manufacturers build either one or the other.

Rockwell-Standard "Hydra-Drives" converters are currently being manufactured in 1 in. increments from 9 in. diameter to 19 in. in diameter, and cover a range of from 20 to 500 (input) horsepower. They provide all of the usual advantages of torque converter drive: high torque multiplication to start heavy machinery or to keep it rolling under peak loads; the automatic balancing of developed torque vs imposed load which eliminates most gear shifting; cushioning of the prime mover and gear trains against the effect of shock from suddenly imposed loads and the ability to keep the power source running at a constant, efficient speed.

Hydra-Drives Sales Manager "Ernie" Harper of Rockwell-Standard Corporation's Transmission and Axle Division told us of many unusual applications of the Hydra-Drives torque converters and transmissions, besides their use by many manufacturers of diesel-driven heavy equipment. "Marriage" of the Hydra-Drives converters, the CDB transmission and the BDB transmission to the wide range of Timken Axles, transfer cases, drive lines and bogies gives Rockwell-Standard a broad base of operations in the heavy-duty power field.

Right—external view of the Rockwell-Standard Hydra-Drives torque converter and left—exploded view showing three main elements, the turbine, left, the stator or reaction member and the pump.





DIESEL FARMING AROUND THE WORLD

By F. HAL HIGGINS

ONE of the revolutions looming on the hay horizon is the "pelleting" or "wafering" of alfalfa at harvest to eliminate baling and two or more handlings of bales. Every big full line farm machinery company led by International Harvester Co. is developing or studying the machine and plans to get on the market soon. Albers Milling Company's Foragizer division at Los Angeles has the first production machine on the market. One was recently installed at Chowchilla, in the San Joaquin Valley, by Sears Alfalfa mills. It is powered by a GM 6030 model of 180 hp and sells at $32,000, plus $5,850 for diesel and $7,200 for 4-wheel trailer that carries the "foragizer." This concentrated hay cuts baled hay shipping costs to make many good alfalfa areas feed producers for the metropolitan milk producing areas as well as getting more of the crop eaten for more milk or beef per acre.

Massey-Ferguson's new 5-6 plow diesel tractor called model 95 is being built for the Canadian trade of "M-F" by Minneapolis-Moline. The latter company put its GBD model through the Nebraska test where it developed a maximum calculated drawbar hp of 58.1. It is a 6 cylinder job with Twin-Disc clutch. M-F will market this diesel as its model 95 in Australia and South Africa as well as western Canada.

North American sales for Massey-Ferguson showed a 19% increase the first half of 1958 over same period of 1957, according to President Albert A. Thornbrough at the opening of the modernized tractor plant in Detroit.

F. Perkins Ltd. is giving a diesel sales course for executives and representatives operating in the agricultural, vehicle, industrial and marine fields. Technical information on various types of diesel engines, fuel injection, sales and service literature, spares and engine re-conditioning.

International's new president, Frank W. Jenks, expects further improvements in the farm equipment business for 1959. President R. S. Stevenson of Allis-Chalmers reported at the same annual meeting of the Farm Equipment Institute that the farm equipment industry would beat 1957 sales by 10 to 15 per cent over 1957. Carl L. Hecker, president of Oliver Corp., and A. A. Thornbrough, president of Massey-Ferguson, Ltd., also voiced optimism at the same convention. President Hewitt of Deere thought it a bit early to forecast, but thought 1959 should be relatively good.

International Harvester Co. has recently sold the British Forestry department a fleet of its BTD6 diesel crawler tractors fitted with Tractovision cabs manufactured by A. Ward, and with Boughton winches. The International Harvester Co. specialists who have been transferred to Europe from California in recent months are introducing the latest farm and logging practices to step up sales in many fields of diesel power.

English hop fields have increased yields 25 per cent by use of the Farrow Rain gun that was mounted on a Ferguson diesel tractor with high-lift loader arms to get the sprayer action above the hop vines. The Massey-Ferguson 65 tractor carries two rain guns to cover 2½ acres in less than two hours with an inch of water. The diesel tractor gives such mobility that the idea is sure to be used with some of the big overhead irrigation systems on the market in this country.

Will hay pelleting machines eliminate balers from the meadows of the U.S. in the next few years? That's a question the editor of Implement & Tractor poses to the writer in a recent letter as he pointed to the many revolutions in farm equipment that have originated in the West. Rice combining, bulk handling of milk in diesel trucks instead of in cans, big crawler tractors for 60 per cent of the drawbar tractor power on California farms, direct seeding of tomatoes instead of transplanting, and push-button grinding, mixing and feeding of beef cattle are a few that stand out. Diesel tractors, trucks, combined harvesters, etc., all play their part as does electric power via both high line and motor.

Diesel powered International TD 14 tractor in a rice field in the Sacramento Valley checking for irrigation.

Marshall crawler tractor, powered by a 35 hp Perkins diesel, at work on a farm in England.

The Oliver OC-4, 770 and 880 Minneapolis-Moline 5 star, Ford 841 and 851 diesel tractors have all recently gone through the Nebraska Tests. Sea level drawbar horsepower ratings were 24.75, 46.04 and 54.97 for the Olivers, 51.80 for the Minneapolis-Moline, 37.75 for the Ford 841, and 38.90 for the Ford 851.

Exports of British tractors, practically all diesels, were up 18% the first half of 1958 over same period of 1957. British manufacturers are putting the heat on their famous old Royal Agricultural Show to get more space for properly demonstrating their products and this may finally give the old traveling show a permanent home instead of its shifting over the nation at different centers.

Wheel tractor shipments for farm use will total 175,600 units, estimates the leading farm equipment magazine. Larger size tractor trend should lift the dollar value above 1957, or over 45 million dollar volume rise for the year over last. While percentage of diesels is not available at this time, it is running well ahead of all past years since several manufacturers are offering choice of diesel in all models and all of them—International, Allis-Chalmers, Case, Massey-Ferguson, Deere, Minneapolis-Moline, Ford, David Brown have more than one diesel model on the market.

Nebraska Test reports just in give Oliver's two big wheel diesels the 950 and the 990 GM—64.68 and 81.20 hp sea level for drawbar pull. Both were seen in farm Jubilee demonstrations over the U.S. in recent months. The Swedish Volvo T425 and T55 diesel tractors went through the Nebraska Tests last March and rated 22.55 and 59.51 at sea level for drawbar power. Both are on the U.S. market now. Oliver's 880 diesel tractor has just gone through the Nebraska test with a 54.97 hp at sea level drawbar rating. Engine is 6 cylinder Oliver. Denmark's test station, Statens Redskabsprver, reports these diesels going through its tests: the German Hanomags R35/45 and R24, the Deutz F2 L 514/4; and the Valmet 20 from Finland. The latter is a gas engine job for the small 1-plow farms.

Austria's Bundesversuchs Und Prufungsanstalt sends reports on its tractor testing for the past three years. It started in 1947 to test farm tractors and other machines to be sold in that country. For motors and tractors, these firms sent their latest models through the Austrian tests: Steyr-Daimler-Puch, Warchalowske, G. Stifter, F. Schnoll, H. Lindner, C. A. Kaiser, J. Panny, Klockner-Humboldt-Deutz, OECE, Hatz, Geb. Eicher, Eisner, Prochaska & Co., Eicher-Vertretung, Jensacher-Werke. Ferguson and McCormick tractors went through the Austrian tests in 1957, and a Lanz tractor in 1956 before it became a Deere & Co. subsidiary. The Austrian station illustrates its reports of tests with a picture of the tractor tested prominently displayed on the front cover.

Remote control of farm tractor operations was demonstrated at Lincoln, Nebraska to visiting farmers and engineers at the annual program at its famous testing station. Electronic devices for starting, stopping, operation of clutch and brake, gear shifting, steering and raising and lowering cultivator mounted on tractor were demonstrated. Engineers forecast one man control of several pieces of equipment operating at one time.

The Harvestaire combine is getting a re-engineering job done on it by C. W. Smith, retired from the University of Nebraska test work last year after more than 30 years in that key engineering spot from its start. Dr. Smith is now at Columbus, Ohio, and recalls the screening job done by the Nebraska Test from the early 1920's as hundreds of gas kerosene, L.P. gas and diesel models went through their tests. Now there are 18 different nations beginning to set up testing stations patterned after the Nebraska work with adaptations to problems in the various areas. Some are testing other machines besides tractors as the mechanization trends spread. Practically all tractors now going through these foreign testing stations are diesels.

Pelleting of sugar beet tops for cattle feed is being done experimentally in at least two areas in California this fall. Sumner Iron Works 3 in. Hayfer machine is being used by three operators near Tracy as they plan to operate on a custom basis with demand building up from all live stock farmers. Feeding tests are being carried out in many states from the deep south to the Canadian border, and from coast to coast with both pellets and wafers made from several different roughages mixed with grains and molasses. Both portable and stationary mills are being used with diesel tractors powering the new field machines.

Oliver model 500 orchard sprayer powered by the company's super 88 tractor engine.

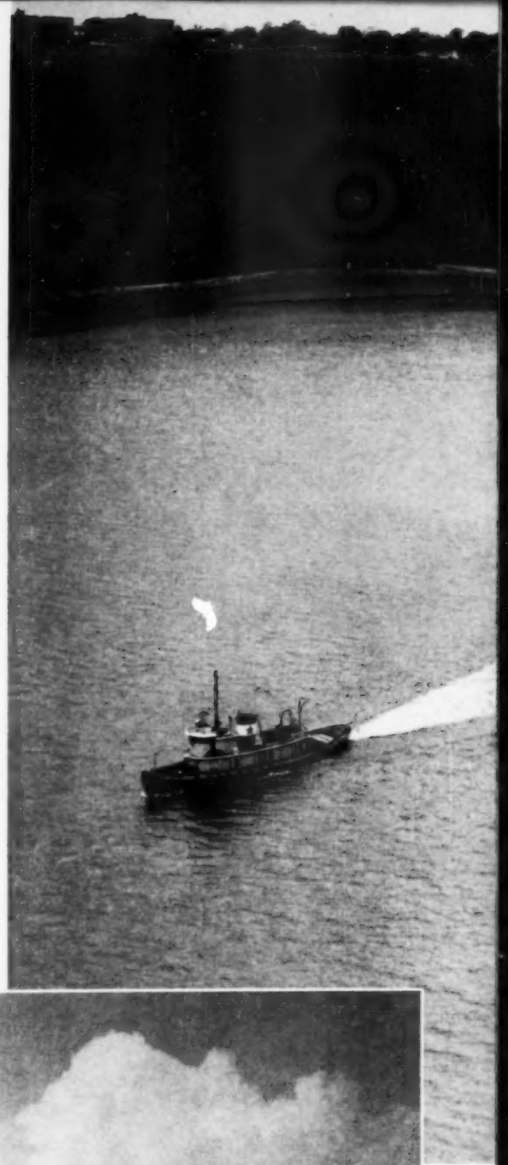
One of a battery of GM diesel equipped booster pumps in use at the Garrett Company's 5000 acre vineyard in Cucamonga Valley, Calif. For 3½ months out of the year the diesel-operated pumps work 22 hrs./day pumping at the rate of 1300 gals./min.

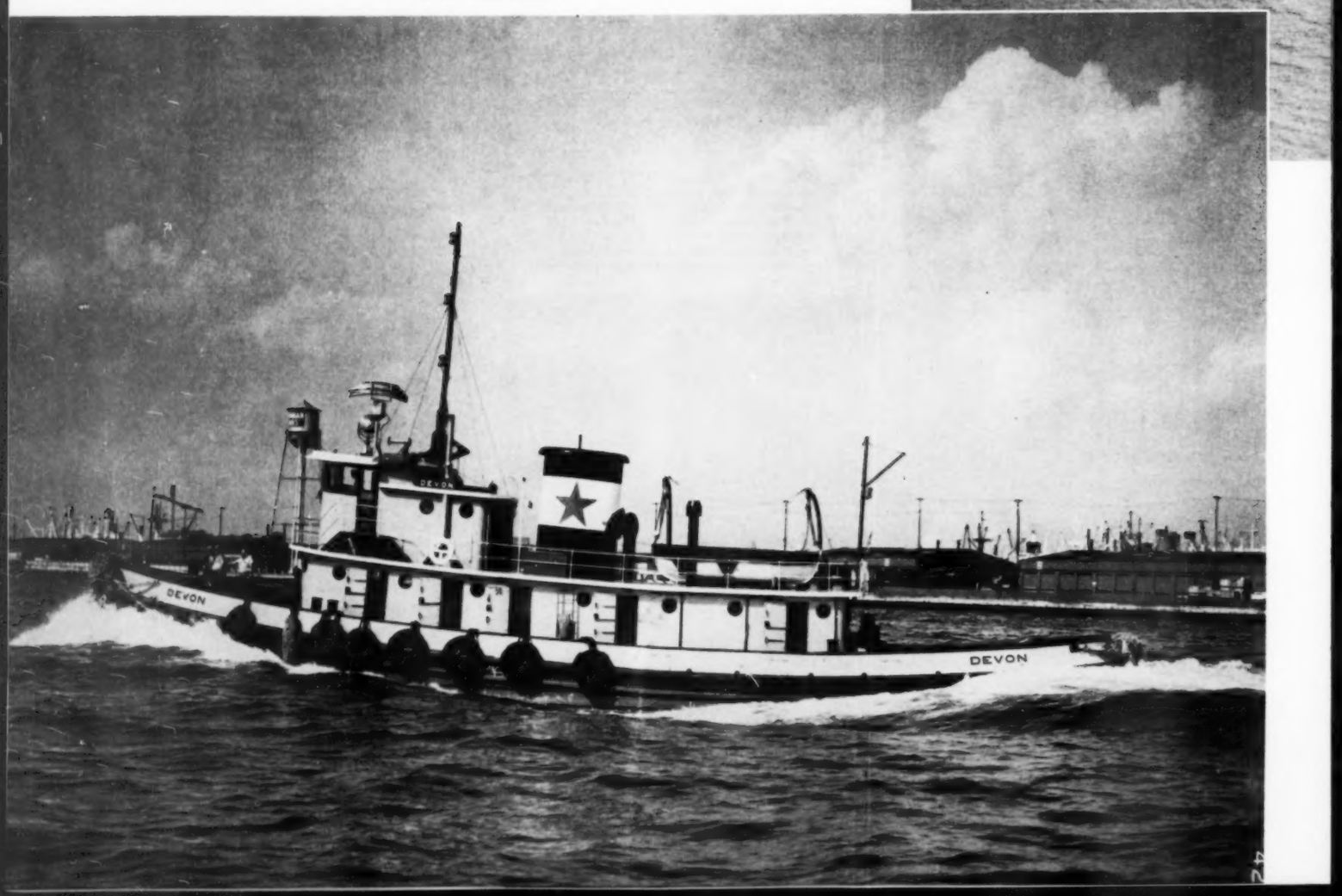
CRUSADER II NOW THE *DEVON*

Re-powered With A 1600 hp Cleveland Diesel Driving Through A Wichita Slipping Clutch And Falk Reverse Reduction Gear.

By DWIGHT P. ROBISON

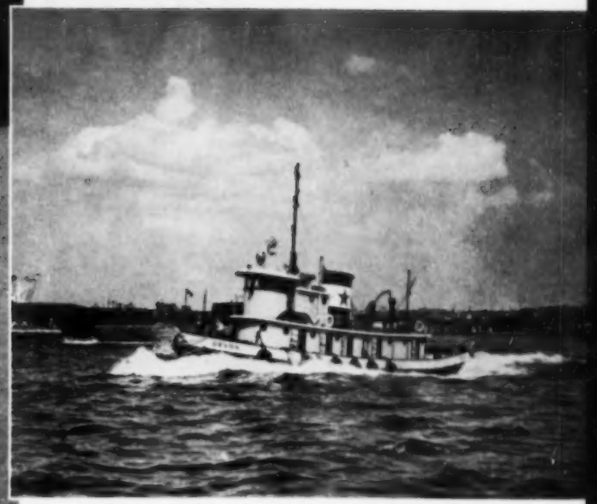
WITH the installation of a new General Motors 1600-shaft horsepower diesel engine in the tug *Devon*, the Red Star Towing and Transportation Company of New York have increased the size of their modern fleet. The general trend throughout the marine industry for greater horsepower in tugs has been brought about by the increase in the size of tows and the greater power required to dock the larger vessels, especially the super tankers. The *Devon* was built in 1941 by the Ira S. Bushey & Sons, Brooklyn, New York. The tug was originally named *Crusader II*. Since that time the *Crusader II* has been in general towing service for the Red Star line. Early this year the conversion of the propulsion machinery was done in the Bushey yard. She was renamed the *Devon* and went into service in June of last year. After nearly six months of service, Robert W. Sanders, Vice President of Red Star Towing and Transportation Company said, "The *Devon* far excells our highest expectations both as to power developed and flexibility."



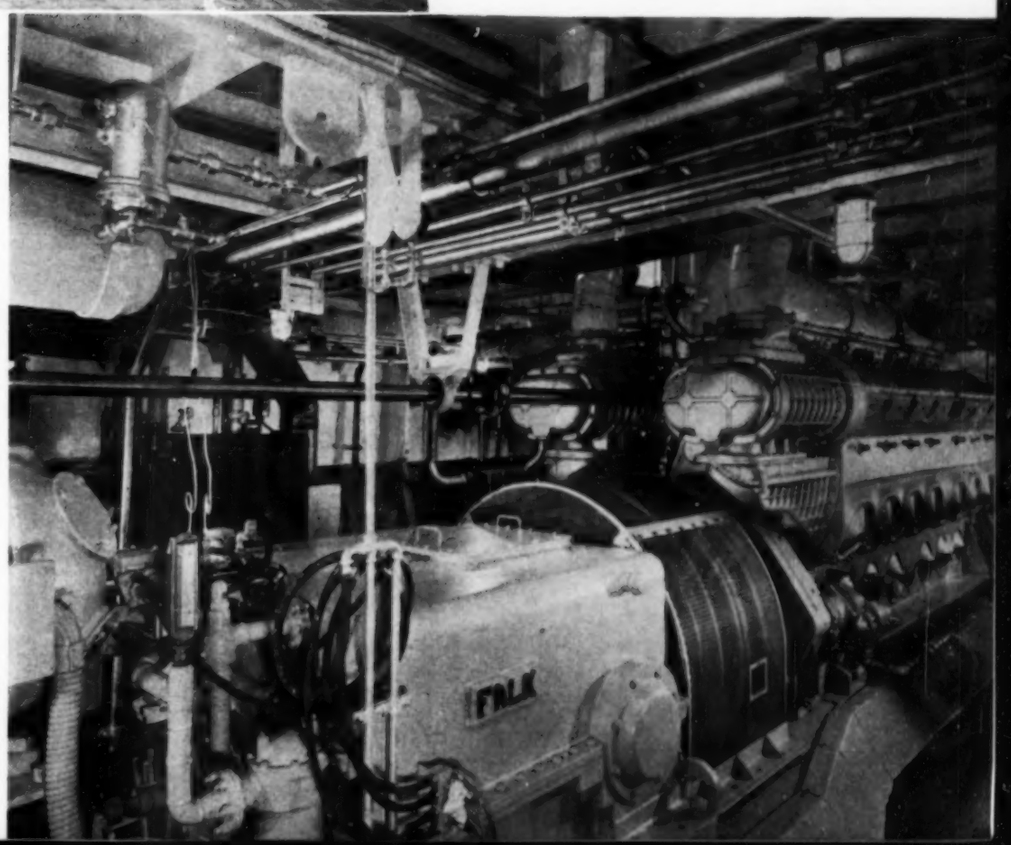


The Red Star Towing and Transportation Company's *Devon*, now powered with a 1600 hp Cleveland Diesel.

Heading toward Philadelphia, the *Devon*, with six barges in tow, demonstrates her prowess.



The increased power of the *Devon* has proven its worth when this tug is engaged in taking tows of oil and chemicals to Philadelphia. On this trip the tows are taken on "open water" because the tow originates in New York. While describing the many kinds of work the tug is called upon to perform, Mr. Sanders made particular mention of the flexibility of the *Devon* in close waters. He said, "This tug is required to go into every creek from New York to the Cape Cod Canal. Some of these creeks are difficult for a 100-foot tug to navigate but the *Devon* with her General Motors engine and Wichita controlled slip clutch can work in these confined waters without difficulty."



Engine room of the *Devon*, showing the 16-cylinder Cleveland Diesel driving through a Wichita controlled slip clutch to a Falk reverse reduction gear. Auxiliary equipment includes Marquette governor, Air-Maze filters and Briggs lube oil filters.

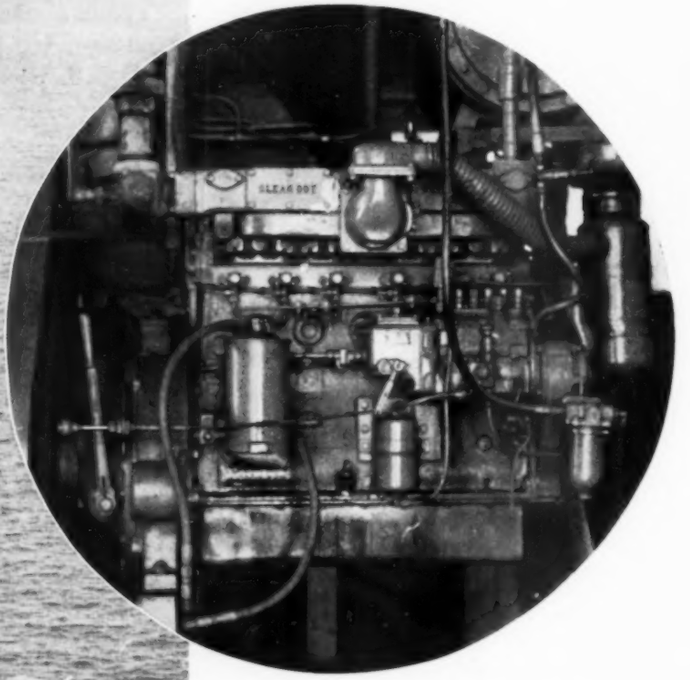
The new power plant of the *Devon* consists of one 16-cylinder, 1600-shaft hp, 2-cycle model 567C General Motors diesel engine. The engine drives a 5-bladed propeller through a Wichita controlled slip clutch and to a Falk reverse reduction gear. The *Devon* is 100-feet long, has a molded beam of 26-feet and a depth of 12-feet. The tug is equipped with not only pilot house control but also a remote control station on the after deck. It can be readily understood why the increased power in the *Devon* is so necessary when a brief description of the work performed by this tug is given. Some jobs are towage of large coal barges and dockage of super tankers in the Ports of Port Jefferson, Bridgeport, and New Haven, Conn. Red Star tugs also do general towing including scows, barges, derricks, and oil barges on the Atlantic Coast. Sand and road building materials are delivered to many companies on Long Island Sound, while the coal is delivered to public utility companies in Connecticut and Long Island.

DIESELS FOR DISTILLATION

MANY millions of dollars are being spent in the Gulf Coast of Mexico in developing needed petroleum resources. This king-sized work often results in man-sized headaches. For instance, every oil company operating in the off-shore branch of the industry is quite familiar with the problem centering around that usually plentiful item: fresh water. Except for some drilling operations, all that water 50 ft. below the platform just won't do. Fresh water is a necessity. There are only two ways to obtain fresh water offshore: either transport it, or manufacture it from seawater. Determining which method is best depends on many factors, a few of which are distance from the coastline, distance of fresh water from that point, type of drilling to be done, cost of barges and towboats, weather, etc. The solution arrived at in many cases is to install one or more thermocompression distillation units and most of these are powered by diesel engines. Why diesels? Because they are more efficient and their reliability makes the distillation unit a completely self-contained, independent machine.

The distillation units are installed on the fixed off-shore platforms, on tenders or on the movable submersible type drilling barges. The units generally operate continuously 24 hrs./day producing water for the various types of drilling mud and for drinking and cooking as well. When they are used for producing water for drinking and cooking only, they might run only two or three days a week. Thermocompression is a method of evaporation in which seawater, usually in vertical tubes, is boiled, the steam from which is withdrawn, compressed and then directed back to the outside of the tubes. This compressed steam gives up its latent heat of vaporization to the seawater, condenses and is drawn off as fresh water. In this process, the diesel drives the vapor compressor and all pumps. The system operates continuously, with the incoming and outgoing liquids transferring heat one to the other in a heat exchanger. A small part of the heat leaves the unit in the distilled water and waste water, and this heat loss, plus the slight radiation loss from the unit, is made up by recovering a corresponding amount of heat from the diesel engine water jacket. It is the same heat from the engine that supplies the original heat necessary to start the system into operation.

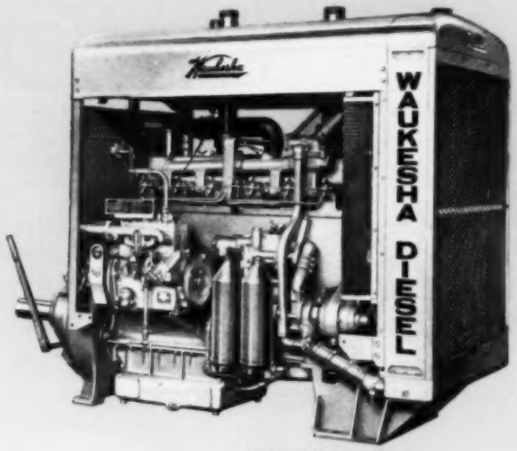
On a dieselized unit, the average power required is about 80 hp/1000 gals. of water. Cooling systems on the engines are thermostatically controlled and held at 216-230°F. which results in better service and efficiency. The average unit will produce fresh water from seawater at a rate of about 225 lbs. of water/lb. of diesel fuel. This is not the best ratio (which goes up to 300 to 1) but it is average. Most of the diesel equipped units have an output of 200 to 600 gpm. Principal supplier of these distillation units is the Mechanical Equipment Co. of New Orleans. In recent years their thermocompression units have reached a high degree of dependability and the company works very closely with the petroleum industry in the Louisiana and Texas offshore operations. Indicative of its continuing research program, the company has just announced and is beginning production of a 10,000 gpd unit in which scaling on the heat transfer surfaces, common to seawater evaporators, has been eliminated. MECO diesel driven thermocompression units can be found operating in such diverse places as a resort island in the Bahamas, desert locations in Libya, islands in the U.S. missile ranges, the Sea of Japan, etc.



MECO 300 gph unit powered by a Allis-Chalmers 6DT-317 diesel, above, is installed on the platform shown to left, which stands in 40 ft. of water.

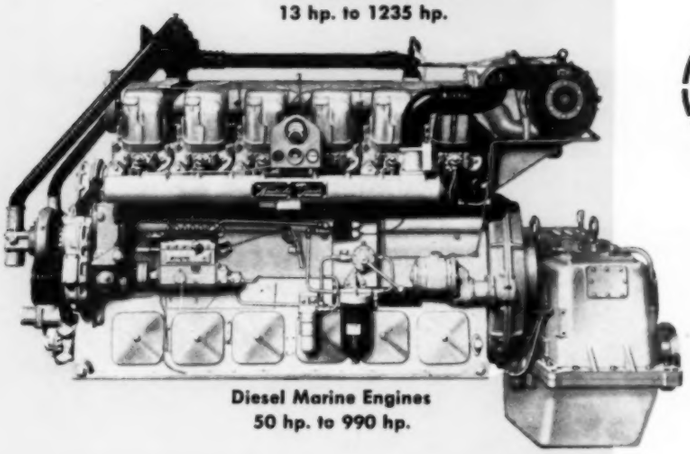
WAUKESHA

Diesels



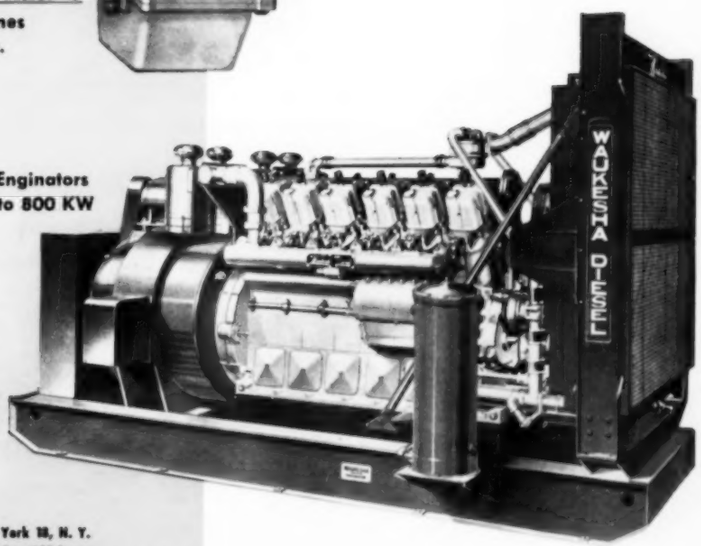
Diesel Power Units
13 hp. to 1235 hp.

13 hp. to 1235 hp.
Normally Aspirated
or Turbocharged



Diesel Marine Engines
50 hp. to 990 hp.

Diesel Enginators
50 KW to 800 KW



WAUKESHA MOTOR COMPANY

WAUKESHA, WISCONSIN

EASTERN SALES OFFICE: Eight West 40th St., New York 18, N. Y.
MID-CONTINENT OFFICE: 5000—S. 45th West Ave., Tulsa, Oklahoma
PACIFIC COAST OFFICE: 4927 Pacific Blvd., Los Angeles 58, Calif.

WAUKESHA Power Ratings

Horsepower ratings and speeds shown herein are subject to change without notice

RATING CONDITIONS—*Engine* ratings are for standard stripped engines without power-consuming accessories. *Power Unit* ratings are for complete units with standard accessories—water pump, manifold, radiator, fan and belt, and air cleaner.

Ratings are corrected to standard 29.92" barometer and 60° F. air temperature. Deduct 3% for each 1000' altitude above sea level and 1% for each 10° above 60° F. except from continuous duty ratings when deduction for altitude is not necessary below 3000 feet.

PERMISSIBLE SPEED—Speeds to left of dividing line are permissible for continuous service; speeds to right of line permissible for intermittent service.

HORSEPOWER—Horsepower shown is maximum. For intermittent duty, the load should not exceed 90% of the power shown. For continuous full load duty, the applied load should not exceed 80% of the power shown.

Ratings and recommended reductions are in accordance with standards of the Internal Combustion Engine Institute of which the Waukesha Motor Company is a founding member.

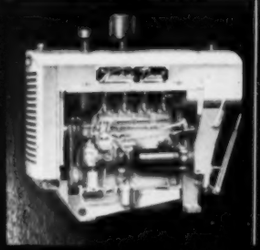
MEDIUM DIESEL ENGINES					800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800
MODEL	Features*	Bore & S.	Displ.	Torque–rpm	BRAKE HORSEPOWER AT SPEEDS INDICATED										
180-DLC	4-AC	3½x3¾	144	102-1800	13	18	22	27	31	35	38	42	45		
185-DLC	6-A	3½x3¾	216	152-1000	23	29	34	40	45	50	55	58	60		
190-DLC	6-A	3¾x4	265	191-1400	27	35	43	51	58	65	72	79	84		
190-DLCA	6-AC	3¾x4	265	191-1400	27	35	43	51	58	65	72	79	84	85	84
195-DLC	6-A	4 x4	302	221-1800	30	39	49	58	67	76	84	91	96		
195-DLCA	6-AC	4 x4	302	221-1800	30	39	49	58	67	76	84	91	96	98	98
197-DLC	6-AV	4 x4	302	216-1600	28	38	47	57	66	74	81	85	88	90	91
197-DLCS	6-ATV	4 x4	302	275-1800	...	...	56	70	84	95	105	115	123	128	131
135-DK	6-A	4¼x5	426	328-1600	44	58	73	87	100	113	124	133	140		
135-DKB	6-ACV	4¼x5	426	328-1600	44	58	73	87	100	113	124	133	140	144	147
135-DKBS	6-ACTV	4¼x5	426	400-1800	...	...	87	104	120	137	151	164	173	180	185
148-DK	6-AV	5¼x6	779	584-1000	88	111	132	151	169	184	197				
148-DKB	6-ACV	5¼x6	779	584-1000	88	111	132	151	169	184	197	200-2100			
148-DKBS	6-ACTV	5¼x6	779	706-1800	...	...	150	181	213	242	268	280-2100			
WAKD	6-AV	6¼x6½	1197	840-1000	126	160	189	201-1300	224						
WAKDB	6-ACV	6¼x6½	1197	845-1000	128	161	193	221	244	258	[#6 Turbo to 1200 rpm;				
WAKDBS	6-ACTV	6¼x6½	1197	1400-1200	188	200	320	318	370	400 ...	#7 Turbo 1400-1800 rpm]				
LARGE DIESEL ENGINES					600	700	800	900	1000	1100	1200				
NKDB	6-ACV	7 x8¼	1905	1372-700	156	183	209	234	258	279	297				
NKDBS	6-ACTV	7 x8¼	1905	1732-1000	158	203	245	288	330	363	390				
LRDBC	6-ACV	8½x8½	2894	2170-600	248	284	320	350	376	400	415				
LRDBCS	6-ACTV	8½x8½	2894	3580-800	...	463	545	610	645	681	695				
VLRDB	12-ACV	8½x8½	5788	4330-600	495	572	640	700	750	800	830				
VLRDBS	12-ACTV	8½x8½	5788	5440-1000	560	686	810	930	1035	1135	1235				

Ratings below for complete power units with all standard accessories: water pump, intake and exhaust manifolds, radiator, fan and belt, air cleaner.

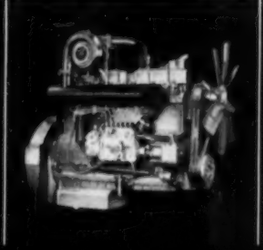
MEDIUM DIESEL POWER UNITS					600	800	1000	1200	1400	1600	1800	2000	2200	2400	
MODEL	Features*	Bore & S.	Displ.	Torque–rpm	BRAKE HORSEPOWER AT SPEEDS INDICATED										
180-DLCU	4-AC	3½x3¾	144	94-1400	...	12	17	21	25	28	31	33	34		
185-DLCU	6-A	3½x3¾	216	147-1000	...	22	28	33	38	42	46	48	50		
190-DLCU	6-A	3¾x4	265	180-1400	...	26	34	40	48	54	60	66	71	75(C)	
195-DLCU	6-A	4 x4	302	206-1600	...	29	38	46	55	63	70	76	81		
135-DKU	6-A	4¼x5	426	308-1600	...	42	55	69	82	94	106	115			
135-DKBSU	6-ACTV	4¼x5	426	379-1800	...	...	...	83	99	115	130	143	154		
148-DKU	6-AV	5¼x6	779	551-1000	...	84	105	124	141	155					
148-DKBU	6-ACV	5¼x6	779	551-1000	...	84	105	124	141	155	167	177			
148-DKBSU	6-ACTV	5¼x6	779	660-1800	...	...	...	141	171	200	226	248			
WAKDU	6-AV	6¼x6½	1197	803-1000	...	120	153	180	190-1300	205-1500					
WAKDBU	6-ACV	6¼x6½	1197	803-1000	...	120	153	180	199	209	212	[#6 Turbo to 1200,			
WAKDBSU	6-ACTV	6¼x6½	1197	1360-1200	...	182	193	311	306	352	373 ...	#7 Turbo 1400-1800]			
LARGE DIESEL POWER UNITS					600	700	800	900	1000	1100	1200				
NKDBU	6-ACV	7 x8¼	1905	1313-700	150	175	200	222	243	258	268				
NKDBSU	6-ACTV	7 x8¼	1905	1650-1000	152	196	236	276	314	342	361				
LRDBCU	6-ACV	8½x8½	2894	2100-600	240	275	310	338	361	381	390				
LRDBCSU	6-ACTV	8½x8½	2894	3500-800	...	453	533	594	623	651	655				
VLRDBU	12-ACV	8½x8½	5788	4245-600	485	560	625	681	727	773	797				
VLRDBSU	12-ACTV	8½x8½	5788	5300-900	549	672	793	909	1008	1101	1191				

***FEATURES:** 4, 6, 12—No. Cylinders; **A**—Aluminum Pistons; **C**—Counterbalanced; **T**—Turbocharged; **V**—Vibration Dampener.

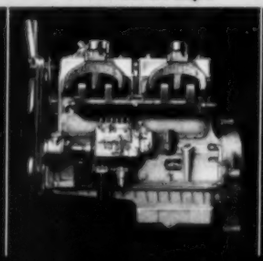
4-cyl. Utility Unit (180-DLCU) 144 cu. in. displ.



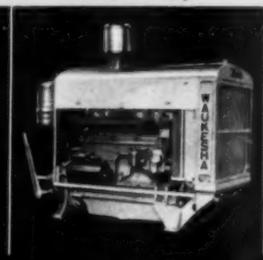
Medium 6 Turbocharged Engine (148-DKBS) 779 cu. in. displ.



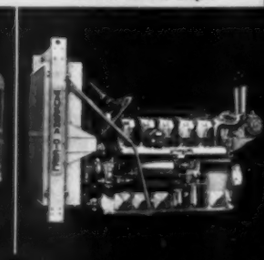
Medium 6 Non-turbo Engine (WAKDB) 1197 cu. in. displ.



Small 6 Non-turbo Unit (135-DKU) 426 cu. in. displ.

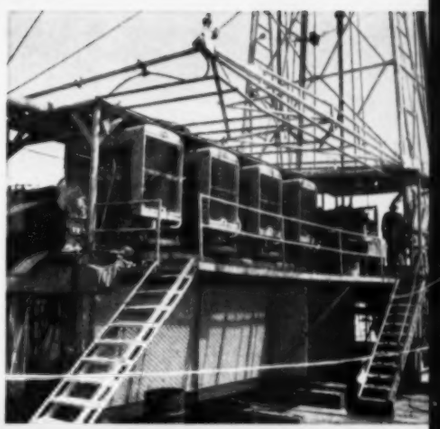


Big V-12 Turbocharged Unit (VLRDBSU) 5788 cu. in. displ.



OIL FIELD DIESELS
13 to 1235 hp.

In the oil fields of the world—for drilling, pumping, compressors, pipeline, or utility use—onshore or offshore, Waukesha means dependable, full-rated power. The development of these smooth, versatile oil field units is backed by over 50 years of study and experience in building heavy duty industrial-type internal combustion engines. Outstanding characteristics are lively acceleration, clean burning, prompt starting, a tremendous reserve of power and great overall economy.



CONSTRUCTION DIESELS
25 to 1235 hp.

All the proven features that ensure long life and the ability to withstand overloads are built into these Diesels. Crankshafts are precision balanced, rugged, and have large bearing surfaces; valve and camshaft mechanisms are carefully engineered; pistons, rings and rod assemblies are installed in matched sets; crankcases and structural elements ribbed and flanged for extra strength; combustion chambers and manifolding are a result of constant research development . . . all engineered to famous Waukesha Quality Control standards.

MARINE DIESELS
50 to 990 hp.

EASY STARTING • SAFETY • SIMPLICITY
SMOOTHNESS • ECONOMY

Six models, normal or Turbocharged

RELIANCE	—12 cyls., 5788 cu. in. displ., 990 max. hp.
DEFENDER	— 6 cyls., 2894 cu. in. displ., 510 max. hp.
WANDERER	— 6 cyls., 1905 cu. in. displ., 315 max. hp.
RESOLUTE	— 6 cyls., 1197 cu. in. displ., 290 max. hp.
VIGILANT	— 6 cyls., 779 cu. in. displ., 195 max. hp.
CUTWATER	— 6 cyls., 426 cu. in. displ., 120 max. hp.

These are maximum ratings for 24-hour duty service.

TRANSPORT DIESELS
30 to 400 hp.

From the complete line of Waukesha transport Diesels you can select exactly the right size and power range to fit your requirements—up to 400 turbocharged horsepower at 1800 rpm in the 6¼" bore and 6½" stroke, 1197 cu. in. model WAKDBS. Smaller sizes available with speeds up to 2800 rpm. Overhead valves, aluminum pistons, replaceable sleeves—all the modern features that give hundreds of thousands of miles of economical, reliable transportation.

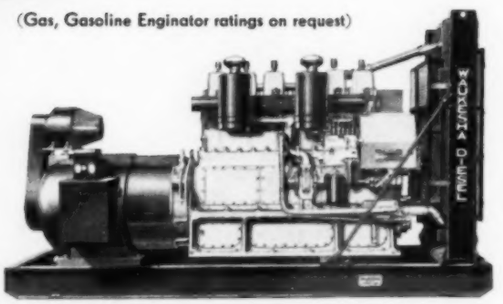
ENGINATORS
50 to 800 KW

Table shows *continuous* capacity ratings—Waukesha Diesel Enginators—50 and 60 cycle.—

Enginator Series	60 Cycle Operating Speeds, RPM					50 Cycle Operating Speeds, RPM			
	600	720	900	1200	1800	600	750	1000	1500
135	NA	NA	NA	NA 50*	60 75*	NA	NA	NA	50 62*
148	NA	NA	50 NA*	70 100*	95 150*	NA	NA	55 80*	80 125*
WAKD	NA	NA	75 120*	100 170*	120† 205*†	NA	NA	85 135*	115 185*
NKD	80 105*	100 125*	125 150*	150 205*	NA	80 105*	105 130*	135 175*	NA
LRD	135 200*	155 245*	185 310*	235† 365*†	NA	135 200*	165 255*	200 350*	NA
VLRD	270 350*	320 410*	385 515*	450† 675*†	NA	270 350*	330 430*	410* 575*	NA

NA = NOT AVAILABLE. Ratings are maximum KW for continuous duty at sea level at speeds indicated. Upper KW figure is for naturally aspirated. Lower figure marked * is for Turbocharged engines. Above ratings are for radiator cooled fan units. Higher ratings permissible with heat exchanger cooling. Higher ratings available for intermittent and stand-by service. † Consult Waukesha Motor Company, stating specific application details.

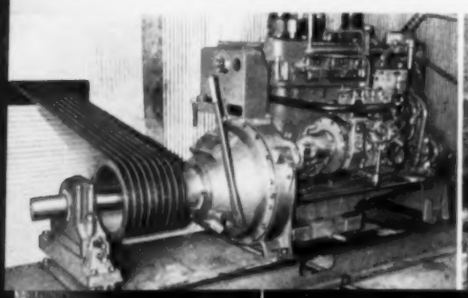
(Gas, Gasoline Enginator ratings on request)

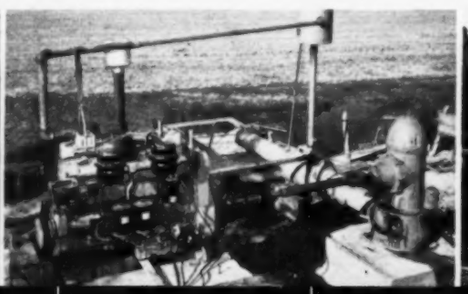


Typical Waukesha Diesel Enginator—Model LRDB. All Enginators available with electrical characteristics, controls, and instrumentation for conventional or special service.

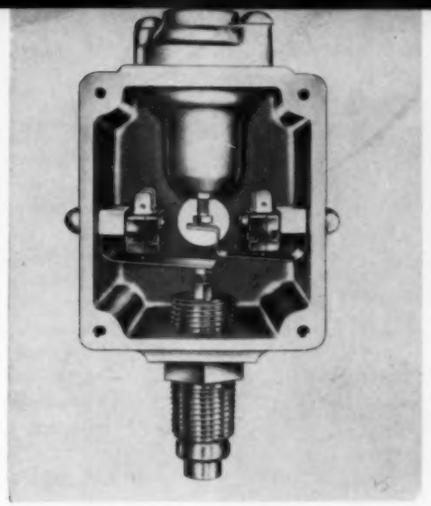
COTTON GINNING • IRRIGATION • LOGGING
Up to 1200 max. hp.

Momentary overloads will not stall these engines; high torque throughout the speed range enables them to pull through, and quick governor response to load variations makes operation virtually automatic. The wide range of horsepower meets the requirements for "something more powerful" with ample reserve for auxiliaries, and permits accurately balanced engine and driven machinery combinations in all applications requiring a smooth, steady flow of power for continuous or intermittent duty

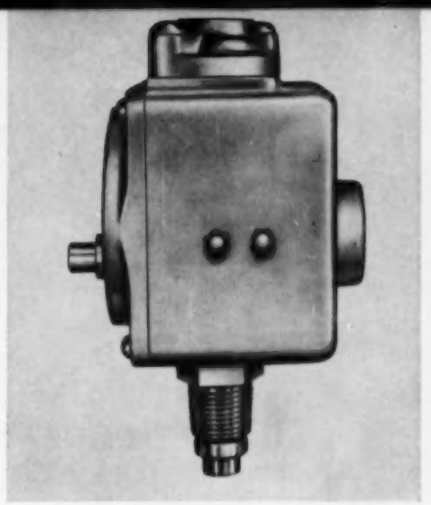




Model 2340 B with cut-out latch button.



Front cover off showing two snap action switches.



Side view showing rear extension for pipe connection.

SIMPLIFIED SAFETY CONTROL SWITCH

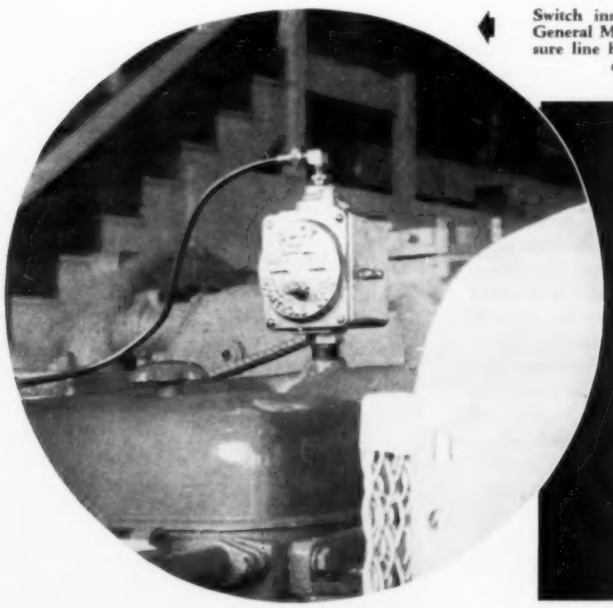
A new safety control switch designated model 2340 has just been released for production by Amot Controls Corp. The switch maintains the characteristic quality of Amot products making it very suitable for protection of large prime movers, yet its design simplicity enables the company to market it advantageously for application on lower horsepower, high production diesels. The switch unit incorporates two single-pole, double-throw, snap-action switches. One switch reacts to high jacket water temperature and the other to low oil pressure. In these or other pressure and temperature applications, switch will sound an alarm, flash a warning light or shut down an engine.

Model 2340 uses the Amot wax-type temperature element to acturate the temperature switch, and a Hycar diaphragm to operate the pressure switch. No mounting brackets are required because the temperature portion of the unit screws into the jacket water piping to support the unit. The switches are equipped with tab terminals and solderless type slip-on connectors are furnished with each unit to simplify the wiring job. The connectors are attached to the wires outside of the switch housing and then fed through the opening in the back part of the housing and slipped onto the tabs. The housing is tapped with a ½ in. female pipe connection so that conduit can be used if desired. If flexible cable is used, a standard electric cable clamp can be used. The housing and covers are high-strength, heat treated aluminum making the unit explosion proof.

The switch is rated at 15 amp. at 125 and 250 volts, ac. The dc rating varies from 15 amp. at 6 volts to ¼ amp. at 125 volts. Pressure setting is adjustable within these ranges which are as follows: 165-180° F., 185-210° F., and 215-220° F. A manual cut-out latch button for the lube oil switch is provided on the new switch to make or break the circuit, if desired, on starting when there is no lube oil pressure. After the engine is started, the lube oil pressure builds up, and the cut-put automatically drops out so that the switch will operate on low oil pressure.

Figure 1 shows a typical wiring diagram. The switch positions shown correspond to the positions at which they normally are, with the engine running under normal conditions. If only one common signalling device is desired, one signal circuit can be removed and the two "NO" terminals connected together. If the switch is to shut down the engine only, the signalling devices would not be used. This would eliminate any connections to the "NO" switch terminals.

On diesel engine applications the unit can accomplish any one or all of the following: close a solenoid fuel valve to stop the engine; sound an alarm; light a signal light; and close a solenoid fuel rack operator. On magneto ignition engine applications the unit can ground the magneto and stop the engine; sound an alarm; and light a warning signal. For dual magneto engines a different model is required. In battery ignition engine applications it will open the battery circuit and stop the engine; sound an alarm; and light a warning signal.



Switch installed on water header of General Motors engine. Lube oil pressure line has been brought to bonnet on top of housing.

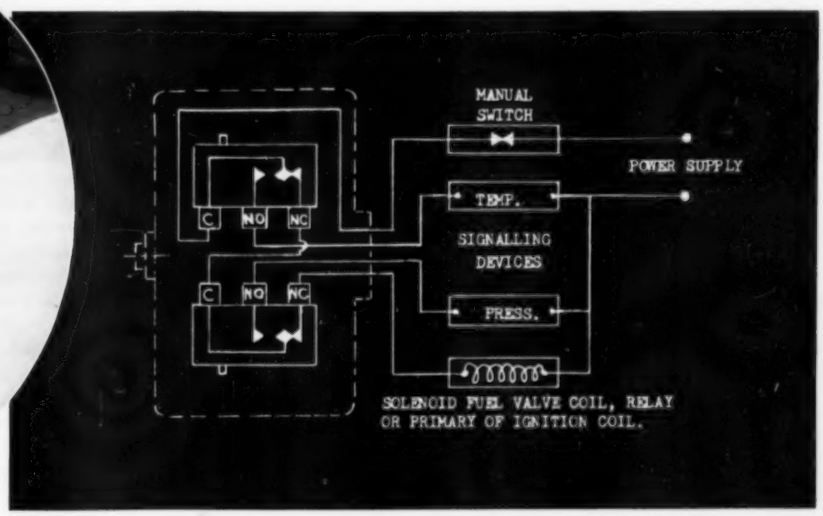
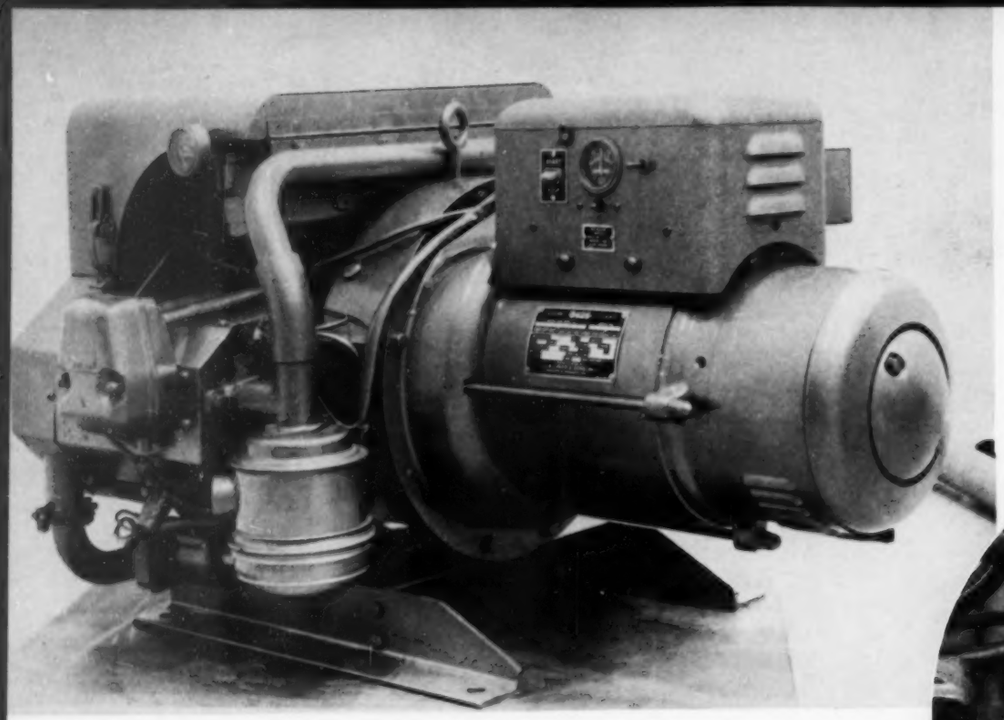
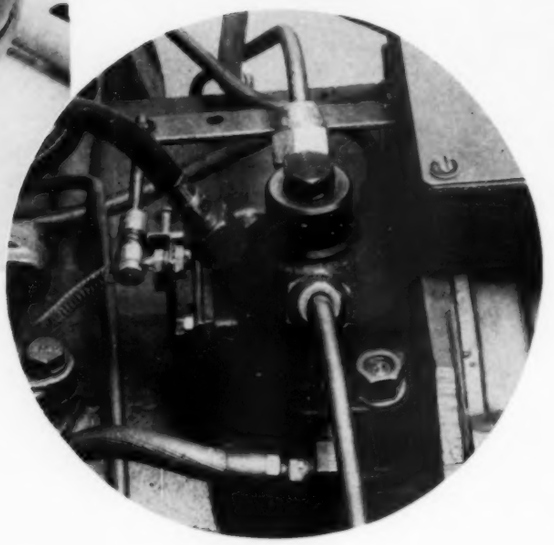


Figure 1. Line diagram of typical circuit.



Onan model DRN 6 kw diesel electric plant. Unit is fitted with glow plug for cold weather starting.

Close-up of the distributor fuel injection pump furnished by Allis-Chalmers.



ONAN DRN 15 HP DIESEL

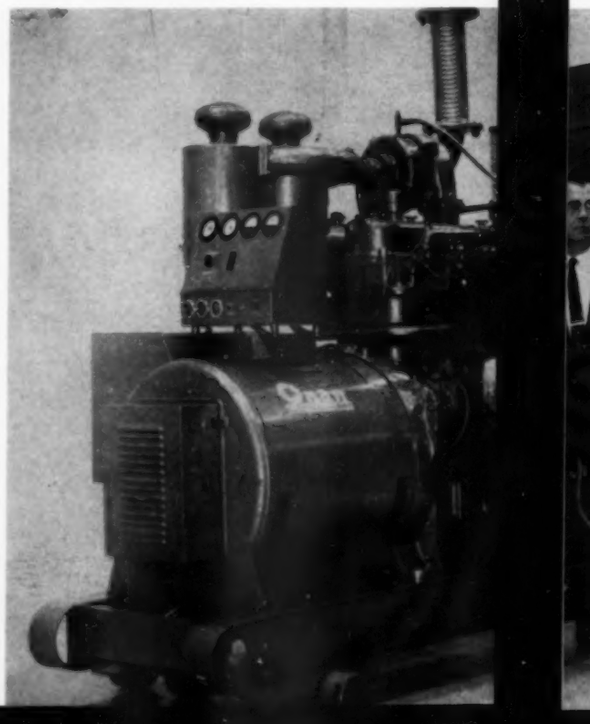
In Addition to Small Engine, Onan Also Introduces Eight New Series of Diesel-Driven Generating Sets From 50 to 200 KW.

A NEW diesel engine, not as yet released for other manufacturer's use, is now in production at the D. W. Onan & Sons Inc. plant in Minneapolis and will supply the driving power for the company's new 6 kw diesel electric generating set. The new engine, series DRN, is rated 13½ to 14 hp at 1800 rpm. Of the four-cycle type, it has two cylinders of 3½ in. bore and 3½ in. stroke with a displacement of 67½ cu. in. and a compression ratio of 17½:1.

Development of this new engine is highly interesting. It is fairly well known that Onan builds its own gasoline and diesel engines and its own generators and controls for all sizes of engine-driven electric plants up to 10,000 watts. In sizes ranging from 10 kw to 200 kw, Onan utilizes commercial engines, primarily Waukesha and Cummins, but still produces all of its own generators and controls for these units. Because of their design and operating characteristics, Onan engines lend themselves to uses other than just powering generating plants. Fundamentally, smoothness of operation, efficiency, continuous rated performance and economy in production are the important factors in each engine's design. Smoothness is of primary importance and this requisite has been incorporated in all Onan two-cylinder engines.

While for years Onan has built and sold its two-cylinder DRP series of diesel engines according to the above principles, its engineers weren't too happy with the unit as a whole. For one thing, the plumbing required for the two separate fuel injection pumps on an opposed-cylinder design engine was not the simplest. And the use of two fuel pumps, with their necessary linkage, made it difficult for the average service man to keep both cylinders running evenly. The possibility of providing Onan with a new distributor injection pump intrigued Demco (now Allis-Chalmers) with the result that Demco made several models for experimentation. Since Onan was the only customers for this pump, it meant that all of the running experience had to be obtained on its engines. This experimentation went on for about five years, until a mutually satisfactory pump was developed. In the meantime Onan was working with other changes, over and above those dictated by the necessary mounting changes for the new pump . . . changes in the basic design of the engine itself which would improve the already accepted degree of operation and maintenance. Here, then, are the design changes which have taken place in the new Onan DRN diesel engine series.

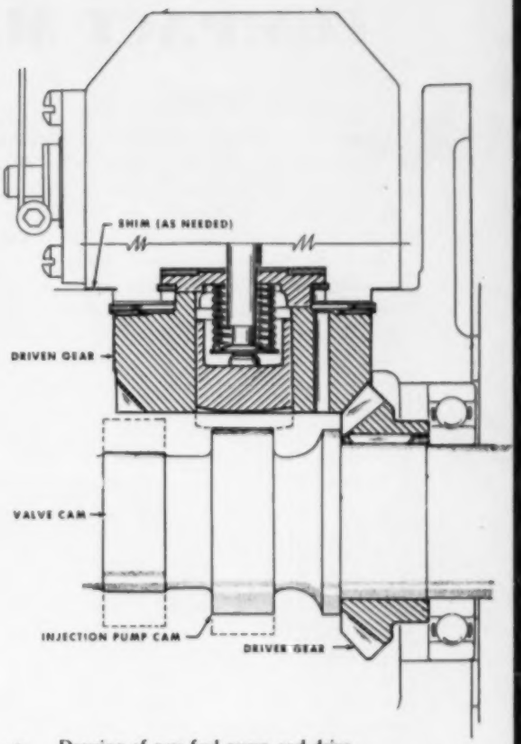
Previously, the crankcase and cylinders had been cast integrally as one piece. Now, although still of cast iron construction, the cylinder barrels are removable. With these separate cylinders adjustment can be made for manufacturing tolerances so that the compression ratio of not only both cylinders of the one engine, but of all DRN engines, is the same. This is quite important to the ease of starting and smoothness of operation. At the same time, the cylinder heads were redesigned to provide for improved cooling and easier manufacture. This new design also permitted use of the Onan Vacu-Flo cooling system. Vacu-Flo is a suction type of cooling for an engine, allowing the engine (or generating plant) to be practically totally enclosed without affecting its operating temperatures. The newly-designed cylinder heads are also of cast iron with gaskets of .010 aluminum.



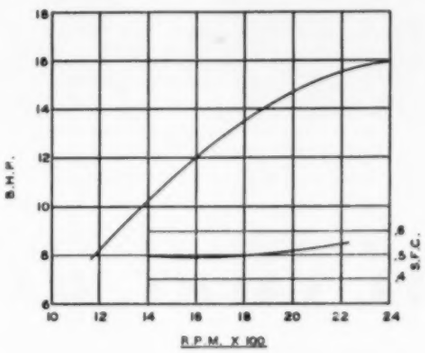
While the mounting of the new distributor injector pump was simple, its actual operational drive was somewhat involved. (Onan purchases the injection pump from Allis-Chalmers and the fuel transfer pump and governor are part of the engine.) The injection pump sets on a milled pad on top of the crankcase. Between the pump and the pad an appropriate number of shims are added to provide proper injection timing. These shims allow for the difference of tolerances in the pad and the pump. Beneath the pump is a beveled gear which engages with another bevel gear mounted on the camshaft. A drive lug on top of the driven gear engages a slotted washer which is part of the pump. A distributor injection pump of this type requires a rotary motion as well as an up and down motion to provide for proper distribution of the fuel in quantity and timing to each cylinder. The bevelled gear arrangement takes care of the rotary motion so required. Then, in the center of the bevelled gear under the pump, there is a tappet which is guided by that gear. This tappet is moved up and down by a cam on the camshaft. Since this is a two-cylinder engine, the cam required two lobes to give one injection stroke for each revolution of the crankshaft. Thus, in addition to the other new parts, a new camshaft had to be designed. The gear under the pump is retained from moving upward by a snap ring fastened in the crankcase. A bronzed thrust washer is inserted between the snap ring and the gear. Thus the cam gear is piloted in the crankcase and the tappet is piloted in the gear. The gear on the pump is held in place when it bottoms on the mating gear on the camshaft. When the engine is running, the driven gear is forced upward against the thrust washer and snap ring. An oil hole is provided in the driven gear to let the oil drain out of the space between pump and gear.

The governor is of the mechanical flyball type and is located in the camshaft timing gear. Speed regulation is 3 per cent. A solenoid connected to one end of the governor spring is energized to run. Interruption of the solenoid current stops the engine by releasing the governor spring. The fuel transfer pump is of the automotive diaphragm type, supplying fuel to the injection pump at 3-5 psi. Three gallons of fuel per hour are bled through the pump to eliminate air and entrapped gases. No manual bleeding of the fuel system is necessary. The new distributor injection pump has distinct advantages over the separate unit on small engines. It eliminates most of the service problems which are caused by throttle linkage being out of adjustment. Fuel distribution is improved to a point where Onan can increase the unit kw rating on its generating plants by 20 per cent. Most important factor is that the fuel distribution will not change with age. Distribution is unchanged with either load or speed, making the unit a better industrial engine.

The changes mentioned above resulted, naturally, in an entire new crankcase. Onan took advantage of this opportunity to relocate some of the accessories and this, together with the other changes made, resulted in a neater, cleaner looking engine . . . as well as a more efficient one with greater horsepower and smoother operation.



Drawing of new fuel pump and drive assembly.

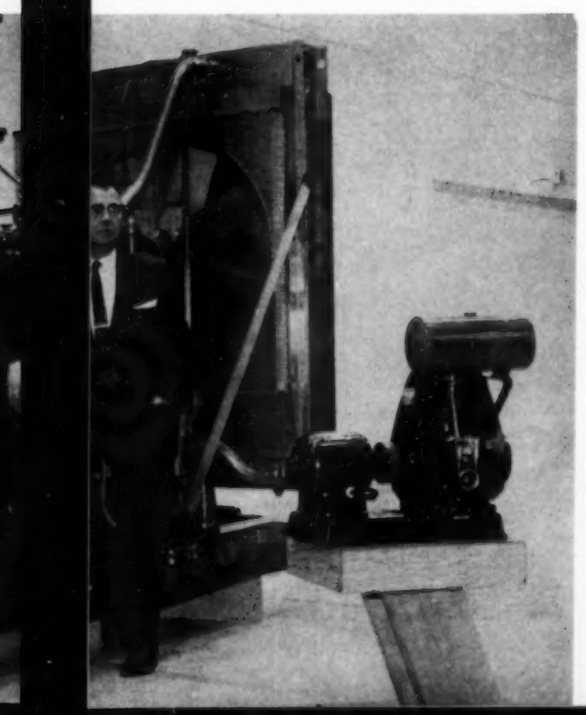


DRN horsepower curve.

New 50 to 200 KW Sets

The eight new diesel generating sets just announced by Onan were developed especially to meet the demands for auxiliary diesel emergency electric power in modern institutions such as hospitals, chemical plants, public buildings, industries and utilities and wherever standby electric power insurance is needed. With this increased capacity, Onan diesel-driven standby plants now have the necessary power to operate essential electrical loads such as automatic heating systems, air conditioners, elevators, communications systems, motors and lights for as long as these services are required. While the new diesel units are rated for continuous duty (50, 75, 125, 150, 175 and 200 kw), the eight new sets are well suited for service as primary power units on construction sites or similar applications where heavy-duty generating plant service is required.

Each Onan plant in these new series is a complete, self-contained electric generating set with the diesel engine, alternator, exciter and control panel assembled into one compact unit. Prime movers for the new plants, up to 150 kw capacities, are Cummins diesel engines. In the two larger sizes, 175kw and 200 kw, the driving engines are Waukesha diesels. While individual features of each unit vary according to specifications, all models of both Cummins and Waukesha Diesel engines operate at 1800 rpm. Each is directly connected to an Onan single-bearing, four-pole, revolving field alternator. On models rated at 50 kw, 60 kw and 75 kw, the alternators are equipped with a dc rotating exciter connected to the main rotor shaft. They are matched to a quick-response automatic voltage regulator assuring a high-stability excitation system. On models rated at 100 kw and up, the alternator is equipped with the new Onan-developed (no moving parts) static exciter and magnetic amplifier regulator. Stable generator operating conditions are established within 2 seconds following any sudden change in load between no load and full load or between full load and no load. A control panel, containing complete equipment to operate both engine and generator, is mounted in a self-contained, enclosed cabinet on top of the generator. A complete selection of optional accessories including automatic line transfers is available for each model.

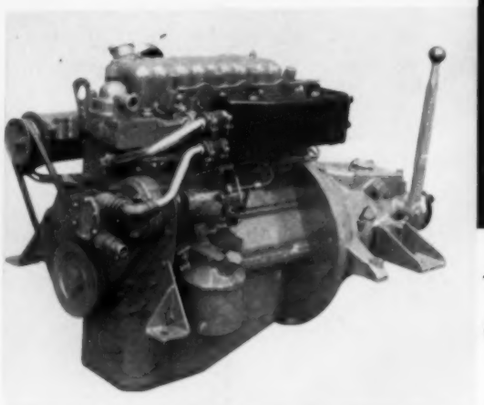


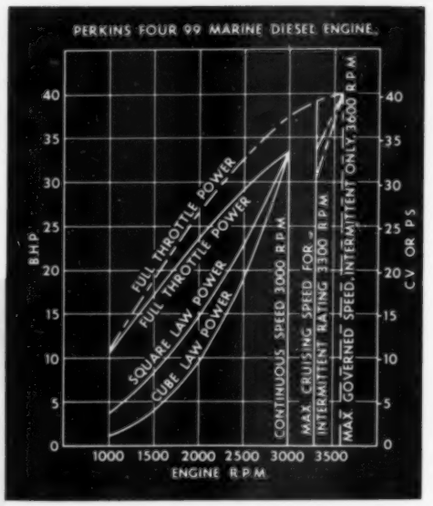
C. W. Onan, company president, displays a 200 kw diesel generating plant, one of 8 new models. Plant is powered by Waukesha diesel. To right is first Onan light plant designed in 1926.

COMPACT MARINE DIESEL

NEW to the marine industry is a compact, four-cycle marine diesel engine recently announced by F. Perkins Ltd. Named the Four 99 (M), this engine develops 33 shp at 3000 rpm for its maximum continuous rating and 40 shp at 3600 rpm for its intermittent rating. It was introduced at the National Boat Show in New York in January and full-scale production has begun at the company's Peterborough, England Works. Unusually small for the power it develops, the engine weighs only 495 lbs in the direct drive version. It is also offered with 2:1 reduction and is particularly suitable for small single and twin screw cruisers, fast runabouts and craft where space is limited and weight of significant importance. The engine has four in-line cylinders of 3 in. bore and 3½ in. stroke with a cu. in. displacement of 99 and a compression ratio of 20:1.

Principal feature of the engine is a new patented combustion chamber specially designed for the smaller sized cylinder and for high speed operation. The upper part of the combustion chamber is hemispherical in shape, and is machined into the clyinder head. The lower half of the chamber is formed by an inserted machined plug, which contains the throat or oval port connecting chamber to cylinder. Fuel is injected into the combustion chamber by means of a pintle type nozzle. During the greater part of the compression stroke, air is transferred into the chamber from the cylinder vertically upwards through the oval port, and produces swirl in the chamber, moving transversely across the nozzle. In the later stages of compression, the direction of air transfer is gradually changed from vertical to horizontal. When combustion is about to begin, the final part of the air is transferred violently from the head, through the special-shaped passages machined in the head and chamber insert, horizontally into the combustion chamber to promote considerable turbulence in the mixture of fuel and air already present. By this means, complete combustion is promoted and the maximum possible quantity of air is utilized.





Marine performance curves.

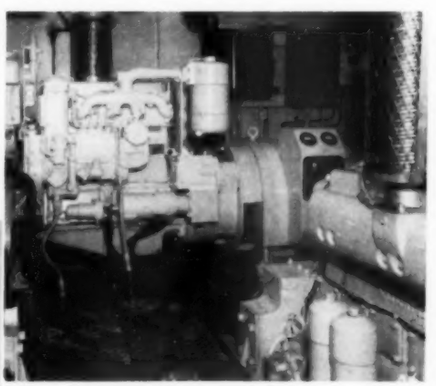
New Perkins Four 99 (M) engine.

Standard equipment on the Perkins Four 99 (M) engine consists of a fuel pre-filter, cold starting fuel container, propeller shaft half coupling, generator regulator and cut-out, and a special starter switch. Extras include batteries 12-volt, 102 amp/hr. capacity, instrument panel, revolution counter, engine oil pressure gauge, engine water temperature gauge, ammeter and power take-off pulley.

DIESEL YACHT, *HALF O*

WHEN the newly launched, dieselized yacht, *Half O*, hit the water and moved along side of the dock at the Quincy Adams Yacht Yard up at Quincy, Massachusetts, it was in keeping with the tradition of the yard and with the request of its owner, Gordon Varney of Coral Gables, Fla., that the new vessel be built by American craftsmen. Mr. Varney, experienced with eight other pleasure craft, designed the new vessel himself. Named the *Half O* after the model railway equipment he manufacturers in Miami, the new yacht is a combination of seagoing construction, off shore cruising and operating economy. Gracious living afloat is just one of its characteristics, its accommodations and equipment is of the finest.

The *Half O* is a 70 ton steel craft measuring 67 ft. 6 in. in length, 18 ft. across the beam and draws 6 ft. 3 in. of water. She is propelled by two D318 Caterpillar marine diesel engines rated 137 hp at 2000 rpm and a continuous horsepower rating of 83 at 1600 rpm. The diesels drive two Columbian 24x24 three blade propellers through Capital 2:1 hydraulic reduction gears to give the vessel a cruising speed of 10 knots. A D311 Caterpillar diesel, 60 cycle 120/240 volt 104 amp, generating set, rated 25 kva is also in the engine room. All three Caterpillar diesel engines were supplied by Shelley Tractor & Equipment Co. of Miami. Besides the owners roomy stateroom the craft has single and double staterooms below plus separate quarters for 2 crew men. The seats in the dining nook can be converted into additional sleeping accommodations if needed. A large salon and a fully equipped galley and the wheel house completes the accommodations on deck. The finest and most modern marine equipment has been installed including all aids to navigation.



Engine room of the *Half O* showing the D311 Caterpillar 25 kva diesel generating set and one of the two main propulsion D318 Caterpillar marine diesel engines. The vessel, left, was designed by its owner, Gordon Varney.

The GTV *John Sergeant* powered with General Electric 6600 shp gas turbine has completed seven round trip crossings of the Atlantic.

NEW MARINE GAS TURBINE APPLICATIONS*

THE gas turbine is now a proven sea farer. It has firmly established a place in the marine prime mover picture and can be expected to be applied at ever increasing rates in doing many ordinary as well as unusual jobs. In areas where extremely high powers will be required, in small space, it is expected that only the gas turbine will be used. As shown in Table 1, gas turbines have now accumulated about 103,000 hrs. at sea on propulsion and auxiliary installations. Free-piston gas turbines at sea have operated some 73,820 hrs. as shown in Table 2. In Table 3, the summary of gas turbines and free piston gas turbines in marine use show a total of approximately 313,000 hp. Here is a description of some of the engines in use or building that were not covered in reports published in the February and March 1958 issues of DIESEL PROGRESS.

French Merchant Ships. Two new ships are being built by la Marine Nationale Francaise with free-piston gas turbine propulsion plants. These ships will have an installed power of 16,000 shp and will use GS-34 gasifiers.

500 kw Generator. The British Admiralty has installed a gas turbine driven 500 kw generator in the *H. M. S. Llandaff*. This is a base-load set. The type C turbine was designed and constructed by W. H. Allen Sons and Co., Ltd.

PT 812. The U.S. Navy has replaced the reciprocating engines in this vessel. There are two 4000 hp Metropolitan Vickers G-2 gas turbines—one each on the two outboard shafts, and there are two 600 hp diesels—one each on the two inboard shafts. There are no clutches in the outboard shafts. Astern power is provided by controllable-pitch propellers on the two diesel-driven shafts. In this plant the diesels provide needed power up to 18 knots. The gas turbines are used for speeds greater than the 18 knot cruise condition. Gas turbines can be controlled from either the bridge or engine room. Diesel fuel is used for both types of propulsion engines. A gas turbine driven Solar T-45 portable fire pump is also installed.

Landing Craft Personnel (L). The U.S. Navy recently installed a Solar 500 hp gas turbine in a new 40 ft. LCPL. The decision to make this prototype installation was based on the excellent operating experience gained with a similar engine installed in a 40 ft. personnel boat. During the operational tests, the 40 ft. boat traveled some 16,000 miles at speeds in excess of 25 knots. Astern power is supplied through a mechanical reverse reduction gear. The entire propulsion-plant weight is 2360 lbs., including turbine, gears, and auxiliaries. This is a specific weight of 4.7 lb./shp. The new LCPL has proved to be most satisfactory in operational evaluations. Boat speeds in excess of 23 knots have been obtained. It is of interest to note that the gas turbine boat is 5.8 knots faster. Also the total boat weight is 200 lbs. less for the gas turbine powered craft. Both boats have the same cruising range. As a result of the experience with this LCPL, eight new LCPL's, 36 ft. in length, are being procured with 500 hp gas turbines for propulsion.

Minesweeping Launch. The U.S. Navy's 36 ft. minesweeping launch is propelled by a Boeing 502-8C gas turbine rated at 160 hp. Four boats of this class were built initially. Three were equipped with hydraulically actuated reverse gear, and the fourth has a controllable-pitch propeller. Twenty-six new boats being built are equipped with Boeing 502-10C gas turbines, rated at 220 hp for propulsion. Astern power is supplied by a reverse reduction gear.

H. M. S. Brave Borderer. This boat is the first of the new Brave class fast patrol boats. It was launched on January 7, 1958. The extreme length of the boat is 98 ft. 10 in., beam is 25 ft. 5½ in. This craft is powered by three Proteus marine gas turbines manufactured by Bristol Aero Engines, Ltd. Primmary reduction gear and the reverse reduction gear are manufactured by W. H. Allen and Sons, Ltd. The marine rating of the Proteus is 3500 shp maximum for 30 minutes and 2800

**Condensation of excerpts from "1958 Gas Turbine Progress Report—Marine" ASME Paper No. 58-A-46K by John W. Sawyer and Harry M. Simpson. Presented to the American Society of Mechanical Engineers, December 3, 1958.*

Table 2 Operating hours at sea on free-piston gas turbines

Vessel	Country	Gasifier manufacturer		Plant rating[c]	Application[a]	Hours operation	Operation up to[d]	Vessel miles[b]
Cantenac	France	SIGMA	GS-34	2000	MP	13000	12/57	145000
Merignac	France	SIGMA	GS-34	2000	MP	13000	12/57	120000
William Patterson	U. S.	General Motors	GM-14	6000	MP	1320	3/58	18750
Minesweeper (21 Ships)	France	SIGMA	GS-34	1800	NP	40000	12/56	
Bethsabee	France	SIGMA	GS-14	600 kw	MP	6500	6/57	
					Total	73820		518000 (estimated)

[a] P = propulsion, G = generator, M = merchant, N = Naval
[b] Distance vessel traveled with free-piston gas-turbine-propulsion in use
[c] Rating of plant, not necessarily one gasifier, in shp unless otherwise stated
[d] Approximate date

shp continuous. The specific weight of the propulsion plant is 1.6 lb./hp. The engine and reduction gear weight is 2900 lbs.; a specific of 0.83 lb./hp.

350 kw Generator. This gas turbine driven generator set was designed and manufactured by the W. H. Allen and Sons, Ltd. This is a single-shaft machine. The compressor is single-stage centrifugal with a pressure ratio of 2.7:1. The speed of the turbine is 15,000 rpm. The generator is driven at 1500 rpm through a reduction gear coupled to the compressor end of the machine. The set has automatic starting and is brought on the line in the event of failure of the ship's power supply. The set reaches full speed in 35 sec.

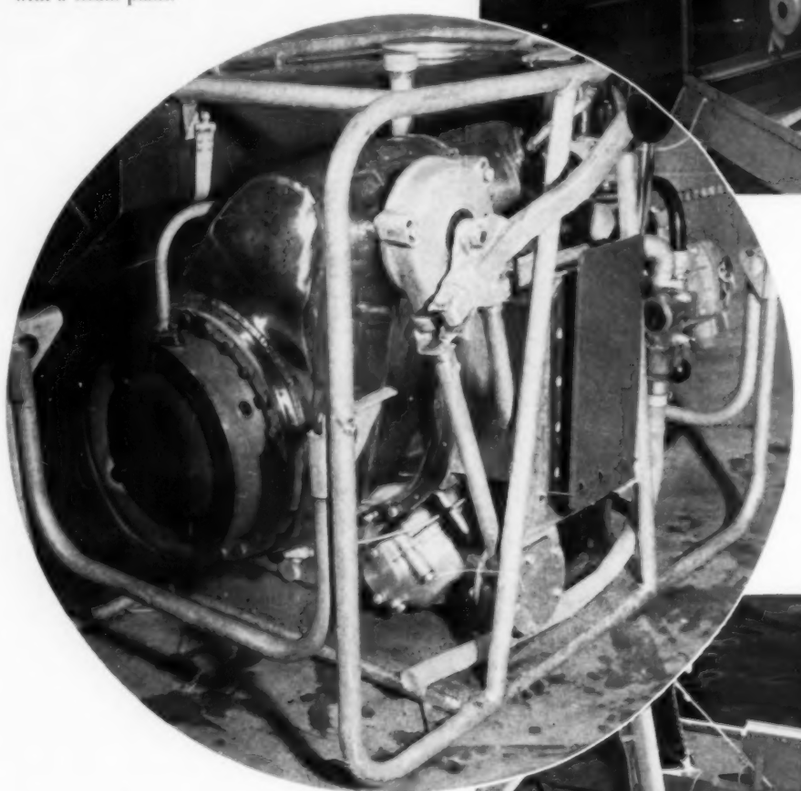
300 kw Generator. A 300 kw capacity gas turbine driven generator set is being installed on the *M. V. Weybridge*. The set is driven by a Ruston and Hornsby T-E gas turbine. This unit has provisions to operate in conjunction with a waste-heat boiler. The specific fuel consumption is 0.98 lb./hp-hr. A second set is to be installed in another vessel.

200 kw Generator Set. A number of generator sets, driven by GS-75 free-piston gas generator and a gas turbine are being produced for the New Zealand Shipping Co., Ltd., and the Port Line, Ltd. The turbine is a three-stage axial-flow unit built by David Budworth, Ltd. The turbine develops 350 hp at 29,000 rpm.

Developments

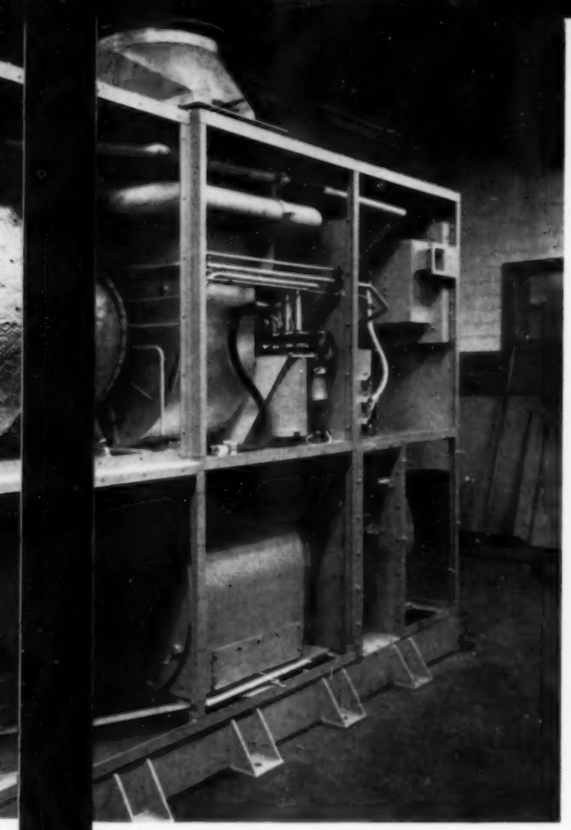
1000 hp. This is a simple-cycle engine with a free-power turbine. It is being developed by Solar Aircraft primarily for high-speed boat propulsion. However, there may be other uses for this extremely compact, lightweight, and low-specific-fuel consumption engine. The engine weight is about 725 lbs. Dimensions are approximately 62 x 42 x 42 in. (length, width, height). The overhaul interval is 2000 hrs. The gas-producer portion of this engine first went on test in Dec., 1957. From these early results the design goal of 0.65 specific fuel consumption is expected.

7500 hp. This is an extremely lightweight engine developed by Westinghouse for the Bureau of Ships for use as a boost unit in conjunction with a steam-turbine base-load plant. Continuous rating is 7500 hp. The engine dry weight is 8075 lbs. It has an axial-flow compressor with a pressure ratio of 4.45:1 and an air mass flow of 130 lbs./sec. Specific fuel consumption is 0.86 at full power. Engine size is 18 x 7.5 x 6.5 ft. Factory test of 500 hrs. at full power was completed satisfactorily on one engine. Three additional engines have passed acceptance tests. Four engines have now been delivered. Three are now on test at the U.S. Naval Boiler and Turbine Laboratory in combination with a steam plant.



Nuclear Gas Turbines. One of the most controversial subjects in the marine field has been the nuclear-gas-turbine propulsion plant. The most significant step taken to date on this subject was the decision in the United States of the Atomic Energy Commission, and the Maritime Administration, United States Department of Commerce, to develop a prototype gas-cooled reactor, closed-cycle gas turbine plant for merchant-ship propulsion, to develop 20,000 hp, announced in a Jan. 23, 1958, press release.

Reverse Reduction Gear, Mechanical. This method of obtaining astern power has been widely used on numerous gasoline and diesel-powered small craft by both merchant and naval services for



300 kw generator set driven by a Solar T-520 gas turbine.

500 gpm, 100 psi fire pump driven by Rover 1S 60 (Curtiss-Wright 300 ST) gas turbine.

U.S. Navy MSL powered by Boeing 502-10C, 220 hp gas turbine.

Table 1 Operating hours at sea on gas turbines[a]

Vessel	Country	Engine manufacturer	Rating[c]	Application[b]	Hours operation[d]	Operation up to	Vessel miles[c]
Auris	England	British Thomson Hoston	1200	MP	19831	12/55	179775
John Sergeant	U. S.	General Electric Co.	6600	MP	4723	4/58	62000
HMS Grey Goose	England	Rolls-Royce	5400 × 2	NP	1344 1279	1/57	
HMS Bold Pathfinder	England	Metropolitan Vickers	4500 × 2	NP	491 471	12/57	
HMS Bold Pioneer	England	Metropolitan Vickers	4500 × 2	NP	355 347	12/57	
HMS MGB 2009	England	Metropolitan Vickers	2500 × 2	NP	550	12/57	
HMS Llandaff	England	W. H. Allen	500-kw	NG	30	12/57	
Dolius (5 ships in class)	England	W. H. Allen	350-kw	MG	600	4/58	
HMS Cumberland	England	Ruston & Hornsby	750-kw	NG	1400	12/57	
USS Gyatt	U. S.	Solar	300-kw	NG	80	4/58	
Minesweep MSB (2 Boats)	U. S.	Solar	200-kw	NG	3521	4/58	
Landing craft (1 Boat)	U. S.	Solar	500	NP	275	4/58	
Personnel boat—40 ft	U. S.	Solar	500	NP	800	4/58	16000
PT-812	U. S.	Metropolitan Vickers	4000 × 2	NP	62	12/57	
Minesweep MSB (46 Boats)	U. S.	Boeing	160 × 4	NG	65083	4/58	
Minesweep MSL (2 Boats)	U. S.	Boeing	160	NG	180	12/57	
Minesweep MSL (4 Boats)	U. S.	Boeing	160	NP	1525	4/58	
LCVP (3 boats)	U. S.	Boeing	220	NP	120	12/57	
Minesweep (62 boats)	U. S.	Solar	46	NA	906	4/58	
LCVP (1 boat)	U. S.	Boeing	160	NP	205	12/57	
Personnel boat (Creole)	U. S.	Boeing	220 × 2	MP	204 204	4/58	
				Total	103000 (approximately)		314000 (approximately)

[a] Some recent installations not in this summary
[b] P = propulsion, G = generator, A = air supply, U = pump, M = merchant, N = naval
[c] Distance vessel traveled with propulsion gas turbines in operation
[d] Where two groups of hours appear on one vessel, first is port, and second is starboard-engine propulsion
[e] Rating shown in horsepower unless otherwise specified

many years, and reverse gears up to 3500 hp are in use on gas turbine boats. The British Navy recently launched the *Brave Borderer* which is equipped with a reverse reduction gear, manufactured by W. H. Allen Sons, Ltd., for the 3500 shp Proteus marine engine. Numerous small craft such as the 200 shp MSL, 500 shp LCPL, and 200 shp LCVP have used commercial-type reverse gears. Experience with a commercial reverse gear in a U.S. Navy 40 ft. Personnel Boat showed that the boat could be brought to a dead stop in 9 sec. from about 25 knots full speed ahead. The ahead reach was 110 ft. The same boat was brought to a stop in one-half its length from an ahead speed of 10 knots.

Controllable Propellers. Considerable experience has been gained with the controllable propeller in marine-propulsion plants. Gas turbine installations with controllable propellers vary in power from 180 to 6600 shp. Designs are in progress for a 10,000 shp controllable propeller and the U.S. Navy has a development project for a 20,000 shp unit. Some recent gas turbine installations with controllable propellers are: (a) *Grey Goose*, 5400 shp (Rotol); (b) MSL, 180 shp; (c) *John Sergeant*, 6600 shp (S. Morgan Smith); (d) PT 812, 600 shp.

Radial-Inflow Turbine With Reversing Nozzles. Development of reversing nozzles for use with a radial-inflow turbine is being conducted by the AiResearch Corp. for the Bureau of Ships. Nozzles have been built and tests are now being made to determine performance of a turbine under ahead and astern operation.

Liquid Cooling. Work on liquid cooling of turbine blades is continuing. The closed system, developed by Solar for the Bureau of Ships, in which water is circulated through blade passages and then out of the engine to a heat exchanger, has been operated at 1700 F for more than 100 hrs. The Pametrada liquid metal cooled turbine where NaK is sealed in each blade, has been operated at 2100 F. Significant improvements can be realized by cooling, which, in turn, permits use of higher cycle temperatures. Thermal efficiencies greater than 40 per cent with cycle temperatures of 2200° F are indicated.

Table 3 Summary of gas turbines and free-piston gas turbines in marine use[a]

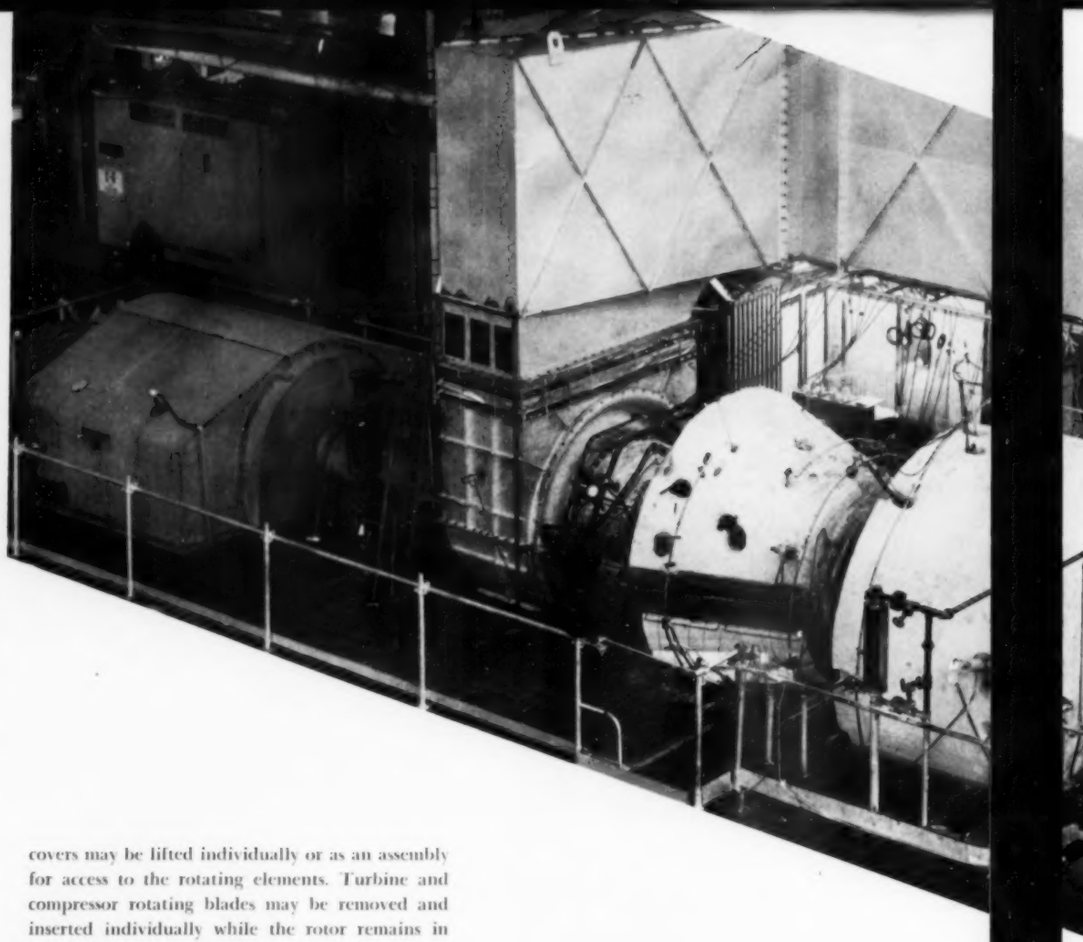
Engine	Merchant			Naval			Total		
	Number ships	Number engines	Total hp	Number ships	Number engines	Total hp	Ship	Engines	Horsepower
Gas-turbine									
Propulsion	9	13	25000	61	80	124000	70	93	149000
Auxiliary	13	13	6000	206	354	51000	219	367	57000
Total	22	26	31000	267	434	175000	289	460	206000
Free-piston gas turbine									
Propulsion	15	17	69000	21	42	37000	36	59	106000
Auxiliary	2	2	1000				2	2	1000
Total	17	19	70000	21	42	37000	38	61	107000
Total									
Propulsion	24	30	94000	82	122	161000	106	152	255000
Auxiliary	15	15	7000	206	354	51000	221	369	58000
Total	39	45	101000	288	476	212000	327	521	313000

[a] Based on reviews of published material.

12,000 HP MODEL W-121 GAS TURBINE

Westinghouse Electric Corp. Produces Its Largest Gas Turbine: Multi-Stage Unit Will Be Installed in Steel Mill in Mexico.

By R. TOM SAWYER



LARGEST industrial gas turbine manufactured to date by Westinghouse Electric Corp. successfully completed an extensive test schedule during December. This model W-121 single shaft unit is rated 12,000 hp for mechanical drive applications and 8500 kw as a power generating unit. This natural gas burning unit will be installed at the largest steel mill in Mexico.

The high temperature exhaust gases of 760°F. from the turbine will be used as preheated air in a fired boiler to produce steam for a steam turbine driven blast furnace blowing unit, this being the first application of its type in a steel mill. This arrangement is very flexible in that the kilowatt output of the gas turbine generator and the air flow from the steam turbine blower can be varied independently of one another. Furthermore this arrangement results in a high overall plant efficiency for a wide range of kw load and air requirements. This particular unit being shipped to Mexico is shown on test at the South Philadelphia Works, Fig. 1. The author not only had the opportunity of seeing this unit in the shop but to observe the way Westinghouse is manufacturing the various component parts and their details. Westinghouse has made remarkable progress since the first unit was built in 1946. It is no easy trick to build a reliable multistage turbine; however, over 80 Westinghouse units of all sizes are now in service. The longitudinal cross section, Fig. 2, illustrates the assembly of the model W-121 gas-turbine compenents. The turbine and compressor rotors are assembled as a single unit and supported on two-pressure-lubricated journal bearings. Both bearings are accessible for complete inspection without lifting the turbine or compressor-casing covers. The resultant thrust load of the turbine and compressor rotor is carried on a segmental-shoe thrust bearing located in the compressor-inlet casing. A single horizontal joint is provided on the compressor, combustor and turbine casings so the covers may be lifted individually or as an assembly for access to the rotating elements. Turbine and compressor rotating blades may be removed and inserted individually while the rotor remains in the casing base. The turbine and compressor stationary-vane assemblies are also removable allowing a complete blading inspection without removal of the rotating element. The fuel nozzle and combustor assemblies are arranged oblique to the axis of the machine so they may easily be removed for inspection without disturbing any other elements of the unit.

The W-121 turbine has 5 stages and designed with a Mach number of 0.5 to 0.6 at the mean blade height for operation at an inlet temperature of 1350° F. The design of the turbine blades is based on a constant mass flow per unit area compressible-flow solution. This gives a radial variation in the degree of reaction from about 10 per cent at the blade hubs to 40-70 per cent at the tips. The degree of reaction is defined as the ratio of pressure drop in the rotating row to the pressure drop across the turbine stage. In addition to the high-efficiency, two desirable characteristics of the moderate Mach number stages are broad operating characteristics and low turbine-disk stresses. The broad operating characteristics of the turbine stage are responsible for the 15 per cent speed variation at full load that is of particular advantage when the gas-turbine unit is used for mechanical-drive applications. Low turbine-disk stresses are a prime consideration since the disk is one of the most critical single elements in a gas-turbine design from the standpoint of long life service and operational safety.

The turbine rotating blades are forged from Inconel material and held firmly in the disks by side-entry serrated fir-tree roots. The five turbine disks are forged from high-temperature austenitic-alloy steel. Discalloy (25 per cent nickel, 13 per cent chromium) is used in the disks of the first three stages and an improved 12 per cent chromium alloy is used in the latter two stages. The disks are stacked and assembled to the torque tube with long through-bolts designed to withstand extreme thermal gradients. The disks are interlocked with curvic couplings which carry the torque load and provide the flexibility that is necessary to withstand the forces produced by adverse temperature

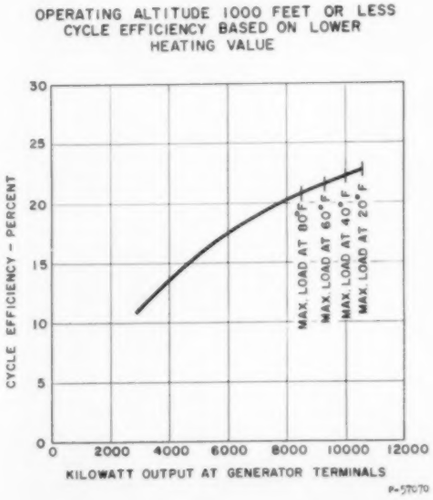


Figure 4—Model W-121 gas turbine power plant efficiency with 80°F. ambient temperature up to 8500 kw, with increased power at lower ambient temperature as shown.

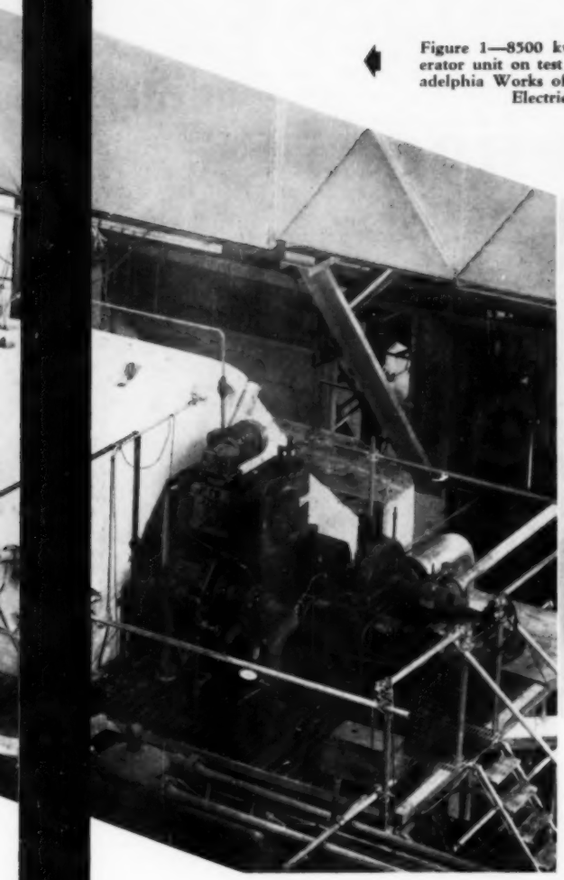
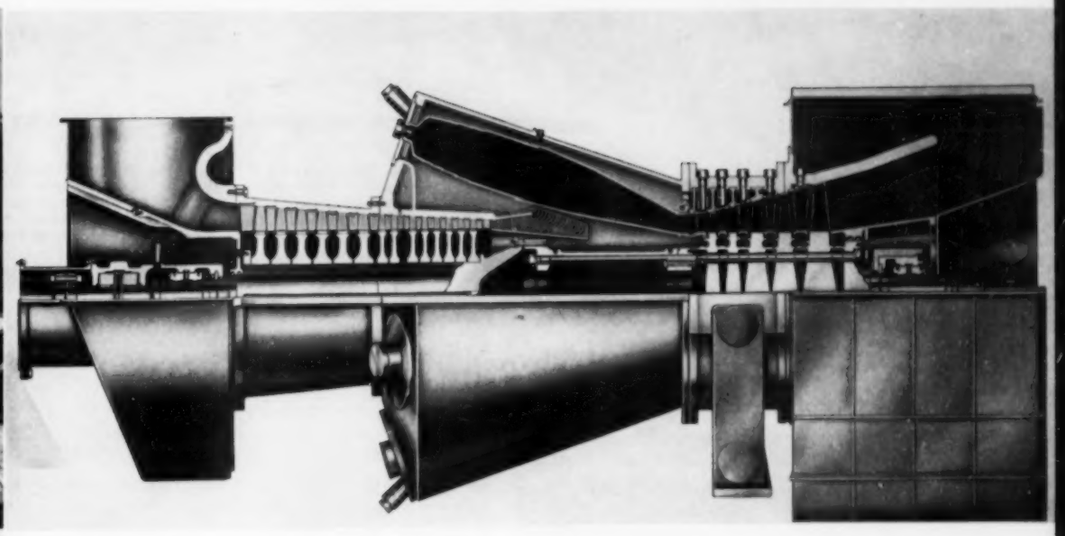


Figure 1—8500 kw gas turbine generator unit on test at the South Philadelphia Works of the Westinghouse Electric Corp.

Figure 2—Cross Section of 8500 kw gas turbine unit showing compressor on the left and turbine on the right in same arrangement as Figure 1.



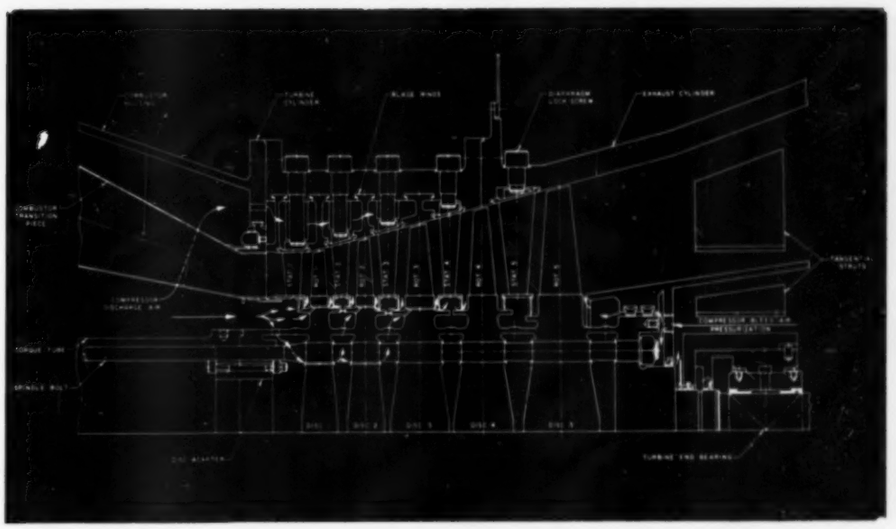


Figure 3—Turbine cylinder and rotor cooling. Direction of cooling air shown by arrows.

distribution. Curvic couplings have proven to be a very successful solution to the thermal-stress problem in jet engines and industrial gas turbines of Westinghouse. The first three stages of stationary blading are manufactured from a 25 per cent chrome, 20 per cent nickel-alloy steel. The last two rows are forged from 12 per cent chrome steel. The stationary blades are welded into inner and outer shroud rings to form half diaphragms. The four diaphragms are supported on separate stainless-steel blade rings mounted in grooves in the casing and cooling air is supplied in the area between the diaphragms and the turbine cylinder. Early experience with industrial gas turbines indicated that the cooled blade-ring construction, Fig. 3, provides a cool turbine casing with minimum distortion, and eliminates the need for insulating any outside surface for high metal temperatures. This construction was first incorporated in the model W-81 and subsequent operation has proven the design.

The model W-121 uses a 14-stage compressor designed to operate with standard inlet conditions of 80°F. and 14.17 psia with a nominal design pressure ratio of 6 to 1 at 4690 rpm. The compressor rotor is constructed by shrinking 14 alloy-steel forged disks on an alloy-steel forged shaft. The rotating blades are forged from 12 per cent chrome steel; a material that has the extremely good damping characteristics required to withstand the aerodynamic buffeting encouraged during starting. The compressor stationary blades are rolled from chrome steel and welded into inner and outer shroud rings to form half diaphragms that are machined to fit grooves in the compressor-casing cover and base. Seal strips are spot-welded to the inner shroud, minimizing the leakage around the stationary diaphragms. The diaphragms may be removed for inspection without lifting the rotor. Each of the 6 combustors are 15 in. dia. and are designed to carry a heat load of 6.5 million btu/sq. ft. per atmosphere.

The unit may be operated on natural gas, oil, or residual oil. A dual-fuel system can be provided to burn gas or oil and change fuels under full-load operating conditions. The performance of the W-121 applied for power generation is presented in Fig. 4. A 25 per cent increase in power is available at 20°F. ambient temperature operation. A 9375 kva or a 12,500 kva generator is available for operation with the unit. The choice of generator is dependent on the customer's electrical system requirements and whether the location enables him to take advantage of the increased gas-turbine capabilities at low ambient-temperature operation.

GAS TURBINE PROGRESS

A COMMENTARY BY R. TOM SAWYER

R. Tom Sawyer's well known in the gas turbine field having been the first chairman (1944) (and now treasurer) of the Gas Turbine Power Division of ASME. He spent 7 years with G.E. Transportation Dept., and 26 years with American Locomotive, now Alco Products. At present he is a Consultant, including "Consultant to the Staff" of the Experimental Towing Tank at Stevens Institute of Technology. In addition to being a Fellow Member of ASME and AIEE, he is a member of SAE, ARS, ANS, IME in London, DEUA in London. He is also a member of Franklin Institute and a Professional Engineer. Mr. Sawyer is the author of *The Modern Gas Turbine* and *Gas Turbine Construction*, and co-author of *Applied Atomic Power*.

Lightweight Automotive-Type Gas Turbine*

COINCIDENT with Bill Turunen's talk* on January 15 in Detroit at the SAE Meeting, the Allison Division of General Motors announced that it is making available to military and commercial users, the production model of the GMT-305, 225 hp Whirlfire gas turbine engine. This is the engine developed by General Motors Research Laboratories and used to power the Firebird III, last of a series of GM show cars. The Whirlfire will be built for installation in heavy-duty on-highway and off-highway vehicles, prime movers, military and marine applications and stationary power plants.

The GT-305 is described by Turunen as follows: "An entirely new regenerative gas turbine powers the Firebird III. This engine, called the GT-305 Whirlfire, is one of the principal features of the advanced engineering concepts embodied in this revolutionary vehicle. Engineering advances in turbine design have been incorporated with many proven features from its predecessor, the GT-304, which powered the Firebird II, to give the GT-305 engine new levels of attainment for regenerative gas turbines in horsepower per pound of fuel and horsepower per pound of engine weight. These advances coupled with more compactness and greater rigidity make the GT-305 engine a new milestone in the development of vehicular gas turbines. The performance of any engine—its output characteristics and fuel consumption—is the result of the thermodynamic characteristics of its components and the pressure and temperature limits of the operating cycle. Each of these must be optimized at the best attainable levels to obtain satisfactory engine performance. The progress that has been made in reducing fuel consumption of vehicular gas turbines is illustrated in Figure 1. The GT-302 used to power the Firebird I and similar to the GT-300 in the Turbocruiser bus had a specific fuel consumption of 1.63 lbs./hp/hr. Two years later the GT-304 in the Firebird II used only .77 lbs./hp/hr. The principal reason for this gain was the addition of regeneration to the cycle to recover heat from the turbine exhaust. The next point on the curve represents the GT-305 engine which attained on test in 1958 a specific fuel consumption of .55 lbs./hp/hr. Here the gain has been accomplished by improvements in all components and is the result of extensive testing."

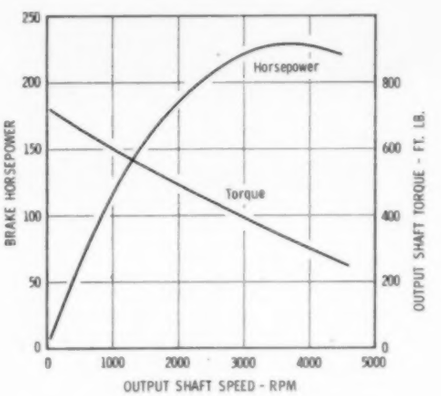


Figure 5—GT-305 test performance—torque and horsepower.

"Two extrapolated points are also shown on this progress curve. The improved performance of the GT-30X engine depends entirely on further component improvements. There is every reason to believe that these performances can be attained and even surpassed with further development work. The last point shown on the curve utilizes

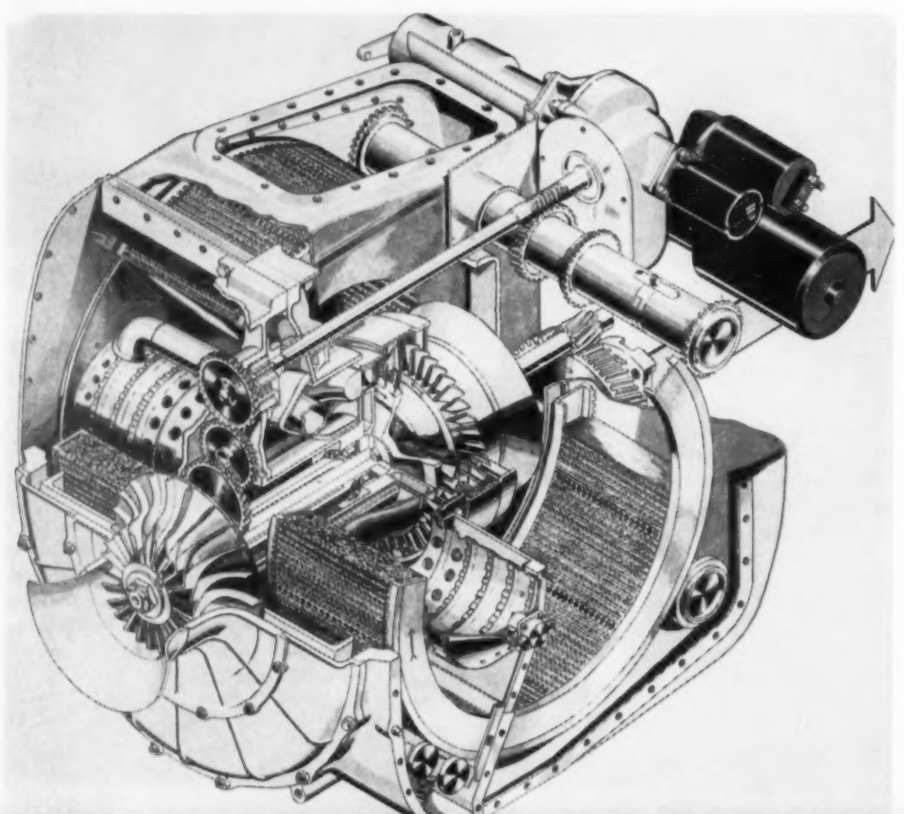


Figure 2—Cutaway view of GT-305 Whirlfire engine.

these improved components in a cycle having a higher temperature limit. The predicted .39 bsfc for the gas turbine engine, when realized, will be more economical than the best vehicular diesel engine-torque converter combination having equivalent output characteristics. The progress that has already been made in the relatively short development life of the vehicular gas turbine leaves little doubt that this goal can be attained. The design of the GT-305 engine effectively integrates the components into a clean compact unit. Figure 2 shows a perspective cutaway view of the engine assembly. The two turbines are arranged on a common horizontal axis. Designed for an inlet temperature of 1650°F., the first stage turbine turns the radial flow compressor at 33,000 rpm through the connecting shaft. The second stage or power turbine immediately behind the first turbine but mechanically separate, drives the output shaft through a single stage helical reduction gear. The power turbine develops full power at 24,000 rpm, which is reduced to 3500 rpm at the output flange. A speed limiting governor permits the output shaft to turn as high as 4,500 rpm to take advantage of the flat characteristic of the gas turbine horsepower curve."

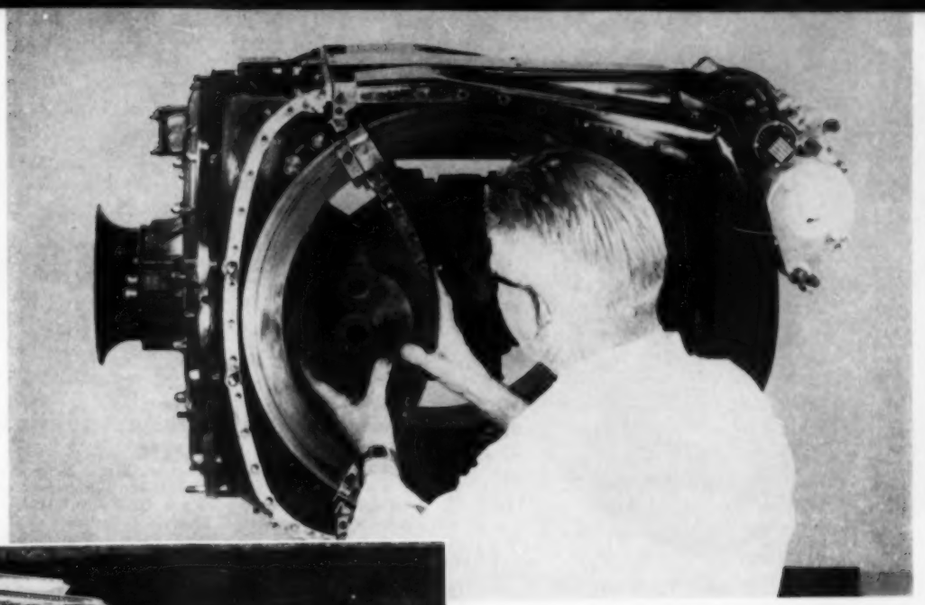


Figure 3—Installation of combustor in GT-305.

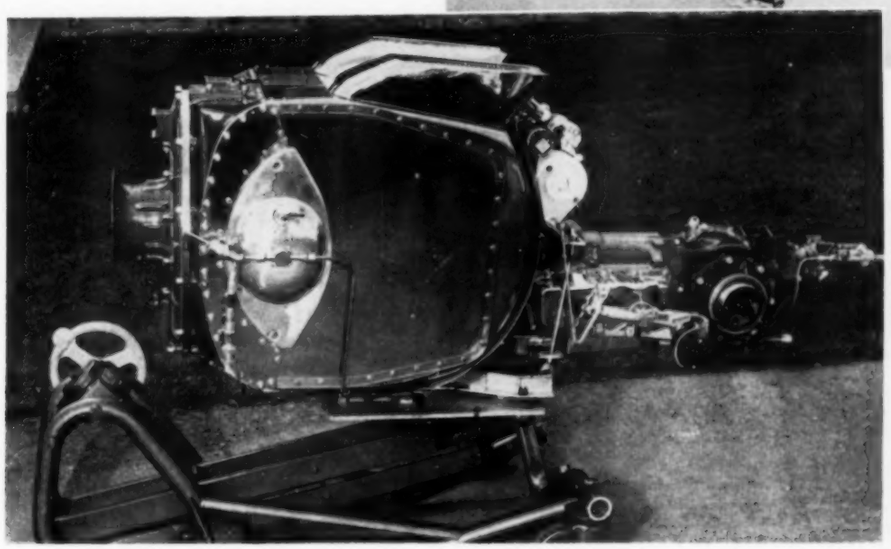


Figure 4—Firebird III power package.

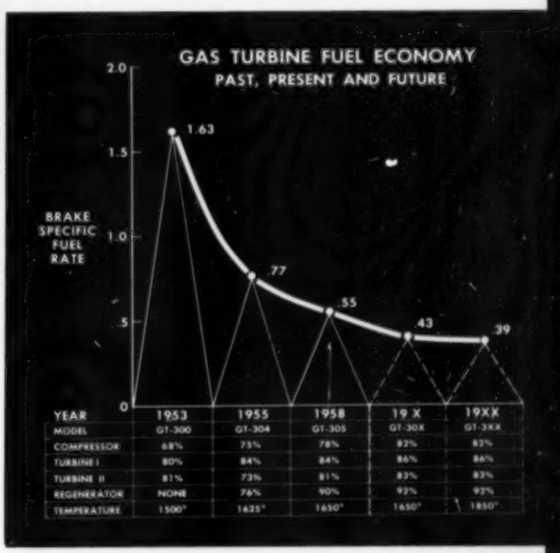
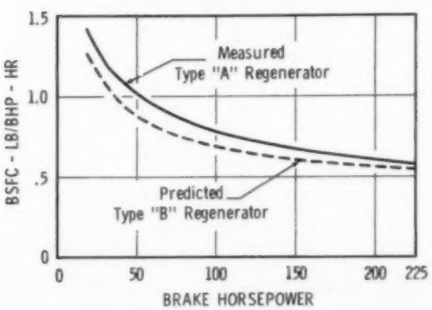


Figure 1—Progress in gas turbine fuel economy. Note that the data definitely shows how the predicted figures will be obtained.

The paper then describes the various component parts of the GT-305 showing its simplified construction. Space does not allow these details. Following this, Turunen states: "Dynamometer evaluation of the GT-305 engine has been even more encouraging than the vehicle tests. Results of actual engine operation are plotted in Figures 5 and 6. The maximum power slightly exceeds the design point of 225 hp. The ratio of stall to full power torque is about 2.25 to 1. A brake specific fuel consumption of .59 lb./hp/hr. has been measured with the type A regenerators. The type B regenerators actually tested on the component rig will reduce the bsfc all along the line as shown in Figure 6. The excellent economy of the GT-305 engine coupled with its light weight, small size, and the many desirable characteristics of turbine power has accelerated application studies by many groups. The most active of these are in the field of military and heavy duty commercial vehicles. Vehicle installations for service evaluation are now underway in a heavy duty Chevrolet truck and in a light weight military tank."

Figure 6—GT-305 performance—brake specific fuel consumption.



"Allison Division recently completed a market survey, production design study, and cost analysis of the GT-305 engine. The Allison design, designated the GMT-305 Whirlfire engine, differs from the Research design only in that some components have been modified to facilitate manufacturing procedures. The cost analysis showed that the GMT-305 engine can be built in production quantities at a price that was no higher than for an equivalent high output reciprocating engine. The market survey established the existence of customers in the heavy duty commercial, military vehicle and marine fields. As a result, tooling has been released for the manufacture of several prototype engines. These prototypes are being sold to select military and commercial users who will conduct their own evaluation programs. With the question of cost and production facilities cleared up, and the availability of prototypes for service evaluation, there is little doubt that the GT-305 engine will find an expanding market."

**The complete paper 21T "The GT-305 Regenerative Engine in Firebird III" by W. A. Turunen and J. S. Collman (G. M. Research Laboratories) can be obtained from S.A.E. 485 Lexington Ave., New York 17, N. Y.*

WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **BERNARD W. LANSDOWNE**

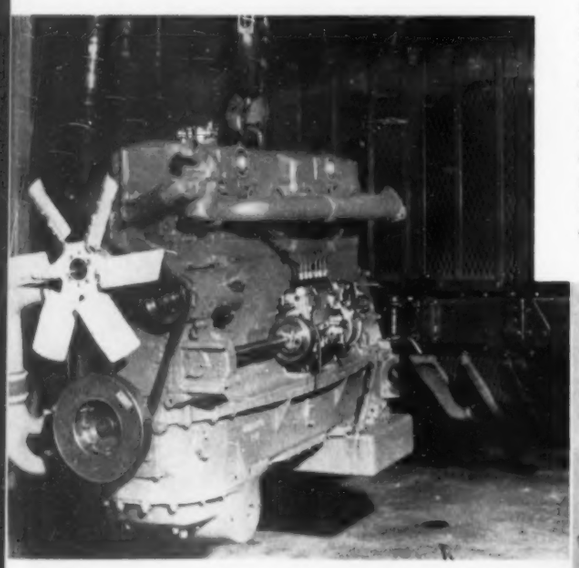
Bernard W. Lansdowne is an associate member of the Institution of Mechanical Engineers and is widely known among British and European diesel manufacturers as a former editor of our English contemporary "Gas & Oil Power." His early workshop training was spread over seven years with A.E.C. Ltd., Southall, following which he served some five years with that company's sales engineering department. He is now manager-for-the-United Kingdom of a group of business and technical publications.

A.E.C.'s Latest & Largest Engine

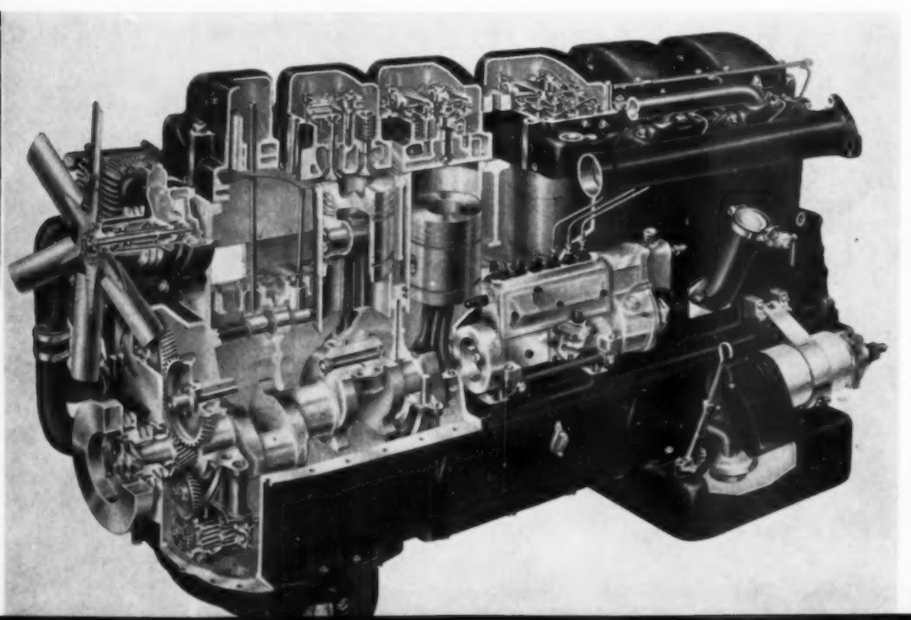
A.E.C. Ltd. at Southall in Middlesex are famous throughout the world as the major supplier of diesel engined passenger vehicles to the vast London Transport fleet of single and double deck buses numbering many thousands. They have been equally successful in a somewhat less spectacular manner in the rail traction and heavy commercial vehicle fields and in supplying diesel engines for a host of industrial applications. It is in these latter categories that the Company's latest development falls, this being a new, large, six cylinder diesel engine in the 200 to 360 bhp range. It has been developed primarily for industrial applications but is equally well applicable to rail traction and the more specialized arduous duties encountered in very heavy commercial vehicles and off-highway type dump truck duty. Both vertical and horizontal versions are available, but the basic design is similar in each case with a very high degree of interchangeability of components. Cylinder dimensions in the new design are 6⅛ in. bore and stroke giving a displacement of 1083 cu. in. (17.89 litres). For applications requiring the maximum possible power output, a turbocharged conversion is available. The turbocharger is mounted centrally above the cylinder heads with the exhaust gas entry coming from a symetrical three-piece manifold.

It is built up on an integral cylinder block and crankcase of fine grained cast iron, the crankcase at the bottom being closed by an aluminum alloy sump. The cylinder liners are of the renewable push-fit wet type in centrifugally cast iron and it is interesting to note that they have a ceramic coating externally to prevent erosion and are sulphur etched internally to promote surface lubrication. The crankshaft is underslung in seven thick-shell copper-lead bearings flashed with lead-tin. It has a vibration damper keyed to the front end and all journals and crank pins are lapped finish. The crank pins are bored for lightness and the spaces thus formed are sealed at each end and communicate by means of drillings with the journals to form part of the lubrication circuit, and to act as effective sludge traps. The main bearing diameter of 4.36 in. and the crank pin diameter of 3.56 in. provide a substantial degree of bearing overlap and great rigidity for the crankshaft. The total main-bearing projected area is 78.74 sq. in. and axial thrust on the crankshaft is sustained by steel backed copper-lead coated thrust strips on each side of the center main bearing.

The I section alloy steel connecting rods have four bolt fixings at the big end and solid type small ends with phosphor-bronze bushes. The pistons are aluminum alloy with a straight sided toridal cavity in the crown. Each piston carries three chromium plated compression rings and two scraper rings. Individual, interchangeable cylinder heads are used, this being a new departure on A.E.C. engines, and each head is locked by two dowels and secured by high tensile steel studs. The heads are provided with renewable valve guides and seat-inserts, each injector being fitted with copper sheaths to assist cooling. Another new departure for A.E.C. is the use of four valves per cylinder, each pair of valves being operated by an adjustable yoke reciprocating on a guide vertical pin. Flat faced piston type tappets transmit the motion from the camshaft to the rockers through inclined push rods. All valves are in high-grade alloy steel with stellite faces and chromium plated stems. The inlet valves are masked to promote air swirl. The camshaft is carried in the engine casing



Semi-section of AV 1100 engine.



Naturally aspirated AEC engine prior to installation in heavy truck chassis.

and is of special case hardening steel with hardened surfaces on its cam faces and bearing journals only, the remainder being soft. It is carried in seven bearings, the housings for which are larger than the cams, thus permitting easy removal and assembly of the shaft. The drive for the timing gear train comprises a simple series of hardened helical gears housed at the front of the engine. The camshaft is driven from the crankshaft gear through an intermediate gear wheel. The crankshaft gear wheel also drives the oil pumps. On vertical engines a further wheel meshes with the intermediate gear to provide the drive for the fuel injection pump. On horizontal engines, however, the drive to the transverse mounted fuel injection pump is through bevel gears, the driver being mounted on the camshaft wheel. A water pump and compressor are also gear.

Full pressure lubrication is provided from the wet sump by a gear-type pressure pump and a circulating pump mounted on the front main bearing cap. The pressure pump passes oil externally through a full flow filter and the circulating pump passes oil to and from the sump through an oil cooler attached to the engine casing extension. The water cooling system is on conventional lines, the cooling water passing through cast passages in the engine casing and cylinder heads. A centrifugal pump circulates the water through the oil cooler into the side of the cylinder heads and out from the top with thermosiphon circulation around the cylinder linings. The fuel injection equipment includes an in-line pump of the enclosed camshaft type with a governor built to the rear end. This latter controls the engine at idling and maximum speeds with the interim speed range being controlled directly by the operator. A 24 volt generator is supplied with the engine and starting is by two 6 in. 24 volt axle engagement starter motors, mounted each side of the engine casing extension. Simultaneous engagement is obtained electrically by a synchronizing starter switch. Among the other auxiliary equipment that is available, is an air compressor or vacuum exhausters of various sizes and output. The dry weight of the vertical unit is 25½ cwt. the horizontal unit weighing 26 cwt.

Program For The 31st Annual Conference And Exhibit Oil And Gas Power Division Of A.S.M.E. April 20 to 23, 1959 At The Shamrock-Hilton Hotel, Houston, Texas

For the early arrivals there will be a *Get Acquainted* Reception at 4:30 p.m. on Sun., Apr. 19.

The first Technical Session will start promptly at 9:30 a.m. on Mon., Apr. 20:

Development of a High Compression Ratio Gas Engine—By: R. D. Henderson, Asst. Director of Research and J. C. Hallinan, Research Staff Engineer, Caterpillar Tractor Co.

Development and Application of a Small 4-Cycle Turbocharged Gas Engine—By: W. M. Kauffmann, Chief Engineer, and D. E. Schultz, Engineering Supervisor, Worthington Corp.

A *Welcome Luncheon* will be held at 12:30 p.m. Toastmaster: Prof. A. A. Rasmussen, Chairman, South Texas Section ASME and Head Mechanical Engineering Dept., University of Houston. *City's Welcome:* Garth Bates, Member City Council, Houston, Tex. A talk on *Citizenship* will be given by W. Hume Everitt, Attorney, The Ohio Oil Co.

Technical Session II will start at 2:00 p.m. The first section will consist of three reports on the following subjects:

AIEE-ASME Recommended Specifications for the Speed-Governing of Internal Combustion Engine-Generator Units—By: L. J. Moulton, Chief Engineer, Marquette Metal Products Division, Curtis-Wright Corp.

The Fifth Edition DEMA Standard Practices for Low and Medium Speed Stationary Diesel and Gas Engines—By: T. M. Robie, Eibor Services, Inc.

Development of ASME-OGP Division Power Cost Reports—By: Chas. P. Ketler, Chief Engineer, Dept. of Public Utilities, Rockville Centre, L. I., N.Y.

These reports will be followed by an innovation at this Conference, where representatives of the Exhibiting Manufacturers will be given an opportunity to present three minute *Briefs* on their new developments.

Special Lecture at 8:00 p.m., Mon., Apr. 20: *Automation in the Oil and Gas Industry*—By: W. S. Quimby, Senior Technologist, Research and Technical Dept., The Texas Co.

Technical Session III will start at 9:30 a.m. on Tues., Apr. 21st. The following three papers will be presented:

Turbocharging Development, 2-Cycle Radial Engines for Point Comfort—By: Robert Cramer, Jr., Nordberg Mfg. Co. and Howard Keefer, Chief Engineer, Point Comfort Operations, The Aluminum Co. of America.

Installation, Operation and Maintenance of Turbocharged, 2-Cycle, Gas Engine Compressors—By: G. H. Bollman, Head, Experimental and Development Section, and W. H. Payne, Manager, Reciprocating Research and Engineering Dept., Clark Bros. Co.

Nondestructive Inspection Procedures for Pipeline Equipment—By: Creed F. Dye, Engineer, El Paso Natural Gas Co.

The Inspection Trips will be taken on Tuesday afternoon, starting at 1:00 p.m.

Trip 1. This is a 130 mile circle tour during which three large gas pipeline compressor stations will be visited:

A. Transcontinental Gas Pipeline Station with 4-4200 hp Nordberg Gas Engines driving DeLaval centrifugal compressors.

B. Tennessee Gas Transmission Station with 16-1600 hp twin tandem, horizontal Cooper-Bessemer Gas Engines driving reciprocating compressors.

C. Texas Illinois Pipeline Station with 6-2000 hp angle type Worthington Gas Engines driving reciprocating compressors.

Trip 2. Busses will take those making this trip to the Turning Basin, the Port of Houston, where ships from all over the world tie up. The Port of Houston boat will then proceed through the ship channel to the San Jacinto Monument and the battleship *Texas*, and return.

At each Conference, the local section of ASME is host at a *Section Party* of their own planning. This year, the South Texas Section is putting on a Western Party and Barbecue, including a round-up of a herd of Texas Longhorns.

Technical Session IV starting at 9:00 a.m. Wed., Apr. 22, will be devoted to the subject of Lubrication with the following papers:

Lubrication! Sez Who?—By: Robert L. Churchill, Engineer, and Frank J. Kokas, Engineer, Tennessee Gas Transmission Co.

A Field Study of Gas Engine Lubricants—By: C. M. Bill Floyd, Senior Research Engineer, and Edward D. Shannon, Sales Engineer, Humble Oil and Refining Co.

On Wednesday afternoon, Apr. 22, Technical Session V will consist of two Panel Discussions of current and vital interest:

Engine Foundations, Design Theory and Construction—Moderator: Robert Cramer, Jr., Nordberg Mfg. Co. with a Panel of Experts on this important subject.

Engine Lubrication and Oil Filtering—Moderator: F. L. Townsend, Sales Manager, William W. Nugent & Co. Panel Members: F. V. Cook, Master Mechanic, Service Pipeline Co.; R. D. Milam, Supt. Compressor Stations, American-Louisiana Pipeline Co.; Geo. W. White, Asst. Chief Engineer, Tennessee Gas Transmission Co. and F. M. Steele, Research Engineer, The Hilliard Corp.

The Annual Banquet will be held on Wednesday evening, with O. H. Moore, Chairman of the Oil and Gas Power Division and Director of Operating Research, Tennessee Gas Transmission Co., Houston, Tex. presiding.

Thurs. Apr. 23rd will be the final day of the Conference with two Technical Sessions as follows: Technical Session VI starting at 9:00 a.m.

Evaluation of Corrosion in Diesel Cylinders—By: J. M. A. Van der Horst, Vice President and General Manager, Van der Horst Corp. of Amer. and W. Schultze, Director of Research, Lemet Chromium N. V.

Engine Waste Heat Utilization in a High Speed Geared Steam Turbine—By: John C. Georgian, Professor Mechanical Engineering, Washington Univ., and Consultant, Engineering Controls, Inc.

Production Design of a Modern Axial Flow, Positive Displacement, Rotary Compressor—By: Walther C. Fischer, Manager of Engineering, Fairbanks, Morse & Co.

Technical Session VII starting at 2:00 p.m.

Mechanical Isolation of Torsional Vibrations in Geared Engine Drives—By: Glen A. Dorton, Engineer, The Cooper-Bessemer Corp.

Advantages of a Tailor-Made Construction Contract—By: R. J. Small, Engineering and Construction Dept., Dravo Corp.

DIESEL SERVICE PROGRESS

A COMMENTARY BY **GEORGE R. MACKEY**

George R. Mackey was long associated with Detroit Diesel Engine Division of General Motors Corp., and had prior experience as a mechanic in Europe and the U.S.A., which enabled him to become well acquainted in the diesel and service fields and to obtain a broad scope of the service industry from the customer's and management's viewpoint. Further training at Carnegie Tech and in the Army Ordnance during World War II provided the necessary requirements in planning service programs. Progressive advancement in diesel service areas in General Motors and with Detroit Diesel led to his position as Supervisor of Service Promotion. Upon termination of employment with General Motors in 1952, he joined Clayton Manufacturing Company, and his present position with this organization is Sales Manager of the Dynamometer Division.

Personnel Management

AMONG the many responsibilities of a modern service manager are those of finding, hiring, developing, and retaining a complete staff of qualified employees. Only by fulfilling these important responsibilities can the service department be expected to meet its obligation to the distributor, dealer, or fleet, and operate at maximum efficiency. Regardless of how modern an establishment may be, or how much up-to-date equipment it may have, unless it is staffed with competent personnel, it cannot expect to function as a well organized, well managed department. An alert manager, realizing the importance of having the proper man for the job, must set forth plans to obtain the staff of competent people and progressively advance the qualified men to key positions of greater responsibilities. This progressive planning, instead of wishful thinking, is one of the important keys to good personnel management that will definitely pay off and will result in a smooth running, profitable service operation.

When it is necessary to hire a man for the service shop, it first must be decided what type of a man is needed. Should he be a full-fledged mechanic? Will a mechanic's helper suffice? Will the man be required to come in contact with customers? Or make important decisions? Will a trainee meet the job requirements? These questions must be answered and the necessary steps taken to find a qualified man to meet the needs. At this time, the question may arise—where can such a man be found or, how can we find a man with the proper qualifications? A general announcement, or advertisement, stating "man wanted" might result in such applicants as janitors, porters, ditch diggers, drifters, or other men who have never done much more than washing or greasing, whereas the man that is needed must be a trained mechanic. Detailed requirements of the available position would result in applicants having the proper training instead of those with undesirable backgrounds.

There are a number of good reliable sources from which applicants for job openings can be obtained. Some prefer to have members of their organization recommend friends with suitable background as job openings arise. Others may rely entirely upon reputable employment agencies, as they often screen applicants before recommending them for interviews. A great many organizations depend upon newspaper or tradepaper want ads. There are numerous service operations that work closely with vocational, or trade schools for job applicants. This latter plan is favorable especially if a student's school work is followed, and his qualifications analyzed before he completes his course of instructions.

There are many other sources from which applicant's, or workmen, may be selected. One successful service manager, located in a farming community, has been fortunate in being able to hire young men "right from the farm." He states that the average boy raised on a farm has been subjected to the operation and maintenance of mechanized equipment and has a fairly good mechanical aptitude when it comes time for him to go to work. Such a man can ofttimes be brought to the stage of production with a minimum of training. Regardless of the source for obtaining potential candidates to fill service positions, the final decision as to the prospect's capabilities, training, background, and qualifications for meeting the job needs must rest with the service manager. If a number of men apply for an opening in the service staff, the one best suited must be selected. This selection cannot be made as a person might evaluate the desirable characteristics of a horse he is planning to purchase. A service manager cannot look at a group of applicants and decide that "one man looks too sloppy," or "another might be too thin," or "he doesn't like the way this one combs his hair," or "this one looks pretty good." How, then, can a proper selection be made? The selection should be made in such a way that the possibility of choosing the wrong man for the job is reduced to an absolute minimum.

Service Personnel and Customers

Very important factors that can seriously affect the total success, or possible failure of a retail service department are—the people whose activities affect the service customers reactions. A list of these people will certainly include the service manager, shop foreman, service salesmen, mechanics, cashier, bookkeepers, field representatives, porters,—in fact, everyone in the department can, in one way or another, affect customers' reactions. Naturally, those who are holding key positions have the most affect on the service customers. Generally, each man in a service organization is covered under a specific job classification. However, in some organizations, one man may be responsible for more than one job. This is quite common in smaller service operations where the volume of service does not justify additional manpower, or constant supervision. This dual position man may have a great many responsibilities and, of necessity, must often be a better man than one who will fill but a single function in a service department. To insure the proper handling and the filling of each job, it is well to draw a parallel between the responsibilities required and the qualifications of the person to fill the job. To determine what the responsibilities or requirements of a job might include, and the personal qualifications of the person, we can set forth a typical analysis of a key position in a service department—that of the shop foreman.

Responsibilities of Shop Foreman

This position requires a close contact with customers, their reactions and requirements. Additional responsibilities are: 1. To make each mechanic realize that the customer is guaranteed a satisfactory job; 2. Make each mechanic realize that he is a member of an organization; 3. Properly supervise the shop activities; 4. Co-operate with other members of the organization; 5. Impart to all members of the service department knowledge of products serviced; 6. Establish and maintain good housekeeping and safety practices; 7. Prevent friction and assure the cooperation of all members of his own, and other departments; 8. Maintain tools and equipment; 9. Maintain shop

records; 10. Satisfy customers; 11. Train mechanics; 12. Plan work for scheduled completion; 13. Maintain good shop employee attitudes; 14. Make necessary contacts with customers when additional work is needed beyond that which was originally covered on the repair order; 15. Maintain shop and company policies; 16. Help the organization operate at a profit.

To meet these responsibilities, a shop foreman must have many qualifications. Among these are: a complete knowledge of the products to be serviced; be a capable mechanic; be a good instructor; be capable of maintaining high standards of workmanship; have a thorough knowledge of how to use, operate, and maintain tools and equipment; have the ability to handle men; be aggressive; be capable of planning work so that it is completed on schedule; have the knowledge of his company's policies and procedures, and know the policies of the manufacturers they represent; be loyal to his employer; be capable of making decisions; understand shop expenses and their control; be a good housekeeper; have the ability to give and secure the cooperation of other employees and departments; be courteous and prompt; and be a good salesman when contacting customers. While this analysis of responsibilities and qualifications has been shown for a particular position, a similar analysis can be developed for any job in the department, even though it might embrace more than one function.

While many of the qualifications for any position in the service department must be inherent in the person holding or applying for the job, many can be developed by training. Along these lines, some manufacturers make mechanical and managerial training available to distributors, dealers, and sometimes to customers. Such training programs are not intended to make—mechanics—shop foremen—or service managers—but are developed and planned to offer additional training to qualified personnel. After obtaining such well-planned training, personnel is better able to perform duties, satisfy customers, help the organization make a profit, and further enhance the reputation of the establishment and the manufacturers they represent. One manufacturer, in his efforts to guide dealers in the selection of the right man for specialized training, stated the following:
"A poor mechanic with specialized training equals a poor mechanic. A good mechanic with specialized training equals a superior mechanic."

New Diesel Motor Grader

Allis-Chalmers has expanded its construction machinery line with the addition of the model One Forty Five motor grader, an 80 hp, 21,540 lb. unit designed to meet market demands for a medium horsepower and weight classification motor grader capable of heavy-duty work production. The new grader increases to three the number of models Allis-Chalmers has available in sizes ranging from the 58 hp model D to the 120 hp model Forty Five motor grader. The One Forty Five tandem drive motor grader is powered by an Allis-Chalmers four-cylinder diesel engine that develops 80 hp at 1800 rpm. It has six forward speeds ranging up to 20.3 mph, and three reverse speeds up to 7 mph.

ITS NEW

New Stratoflex Magazine

Publication of the second issue of, To The Moon, new multi-color magazine, has just been announced by Stratoflex, Inc. According to the company, the title of the magazine is as modern as the space age and is symbolic of the advances being made by Stratoflex and Stratoflex of Canada, Inc., manufacturers of detachable and reusable hose fittings and assemblies. In the 50 pages of the Volume 1, No. 2, Stratoflex reports on new product developments and the industries it serves plus attractively presents many stories of wide spread interest. Indicative of this are the article titles: The Sky's the Limit; The Big Stick; Money, Money, Money; Disneyland; Say It With Music; etc. The magazine is produced by the Public Relations Department of Stratoflex under the direction of Victor LeMay. Copies of the new publication are available and requests should be directed to the company at P.O. Box 10398, Fort Worth 14, Tex.

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AI*935

Sleek and streamlined, the 64 ft yacht *Bubbles*, built by the Huckins Yacht Corp., during a run along the Florida coast.

HIGH PERFORMANCE YACHT

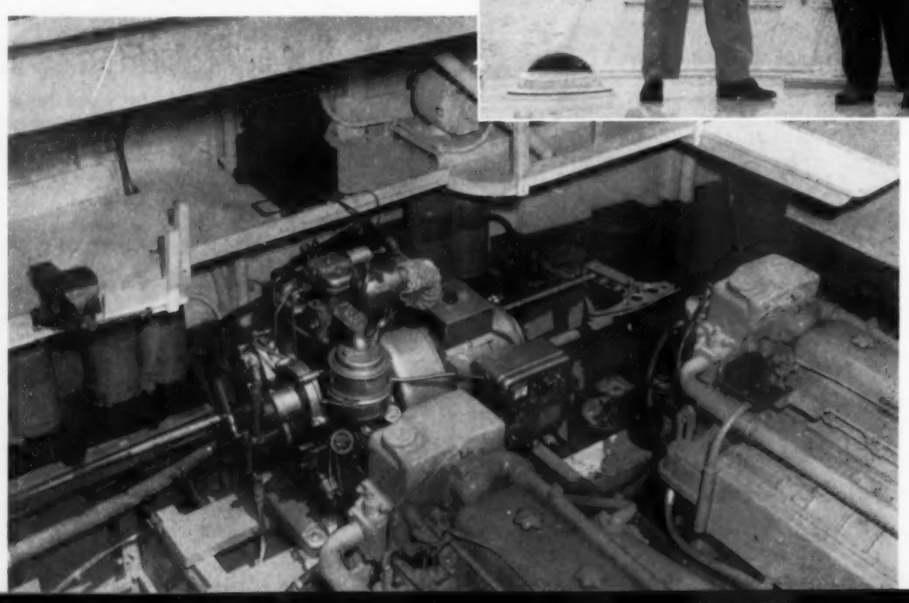
By ED DENNIS

THE distinguished 64 ft yacht *Bubbles* is a craft of grace and comfort, outstanding in maneuverability, performance and speed. It was designed and built by the Huckins Yacht Corp. of Jacksonville, Fla., for Carl Holmes. Sleek and streamlined, the *Bubbles* is a rugged off shore cruising craft and contributes greatly to the Holmes' hobby of skin diving. South Florida and the Bahamas, with its clear blue waters and its proximity to some of the finest skin diving realms the world knows, makes it a skin divers paradise. The thousands of keys which make up the Bahamas and the Florida Keys have an underwater glitter of coral reefs with hundreds of varied scenes to make a kaleidoscopic spectacle for the skin diver. This is mainly what the yacht is equipped and used for.

Recently repowered at Fort Lauderdale, the yacht has for propulsion, three General Motors 6-71-B two cycle diesel engines. These 6 cylinder engines have a 4¼ in. bore and a 5 in. stroke with a displacement of 425.6 cu. in. and deliver a rated shaft horsepower of 235 each at 2300 rpm. The engines, installed aft, transmit their power through Huckins 1.5:1 "V" drive and General Motors hydraulic straight drive to give the craft a new cruising speed of 22 mph at 2000 rpm and a top speed of 25.7 mph at 2225 rpm. Fuel consumption is 21 gals./hr. and the yachts cruising range is about 620 miles or 32 hrs. of operation. The engines are equipped with Elastomer silencers, A. C. secondary fuel oil filters and lubricating oil filters plus Perry, model E, fresh water filters. An Onan 3 kw diesel generating set is also included in the engine compartment.

Hull of the *Bubbles* is triple Philippine mahogany planked phenolic resin bonded with a total thickness of one inch. Her frames are of white Appalachian 1x4 in. oak, the keel is of laminated white Appalachian oak. The keel and stem to which the keel is integrated as well as the keelson to which the keel is through-bolted are inside the hull, there is no outside keel beyond a rubbing shoe. The deck and superstructure is of ¾ in. marine plywood. The owners requirements included luxurious and spacious accommodations. Besides the roomy salon, fitted with regular nautical furniture, there is the owners stateroom for two, complete with shower and toilet and the guests quarters with two berths and a separate head. Up forward and below is the crews quarters for two and the capitan's cabin plus the stainless steel and formica galley with a dinette arrangement. The two fresh water tanks are constructed of 20 gauge .037" monel with a total capacity of 534 gallons. The helmsman has perfect vision in all directions and all engine controls, etc. are in wheel area.

Capt. Alvin Eldridge of the Bubbles congratulates Harold Ellis, president of Ellis Diesel Sales & Service on a job well done, after the trial runs.



Two of the three GM 6-71B, 235 hp engines and the Onan 3 kw generating set. Commercial primary duplex filters are used as are Perry water filters. Delco electric solenoid shut-offs are used on the governors.

Crocker Named Sales Manager

Mr. R. R. Newquist, president of Roots-Connersville Blower Division of Dresser Industries, Inc., has announced the appointment of Glenn H. Crocker as general sales manager effective immediately. Mr. Crocker will have responsibility for the sales of Roots-Connersville equipment throughout the United States and Canada. A native of Kansas, Crocker is a B.S.M.E. graduate of Northwestern University. Joining Roots-Connersville in 1948, he previously served as field engineer, chief application engineer and manager factory sales. His experience in the application of air and gas handling equipment will be available to R-C customers and prospects in the many industries utilizing Roots-Connersville equipment. Mr. Crocker replaces W. W. Harris who resigned earlier this year.

Two Promotions at Allison

Two organizational changes within the Allison Transmission Engineering Department were announced today by E. B. Newill, vice-president of General Motors and general manager of the Allison Division. Mr. Howard W. Christenson, formerly chief development engineer, has been named to head the expanded research department. A graduate of Oregon State College, he joined General Motors Research Laboratories in 1937 and 10 years later was transferred to the Allison Division as a transmission development engineer. Succeeding him as chief development engineer is Robert M. Tuck, who began his Allison career in 1940 in the General Motors Institute program and received his bachelor of mechanical engineering degree in 1947.

Western Services Appointed G.M. Engine Distributor

Western Services, Inc., Mt. Carmel, Ill., has been appointed as distributor for the Detroit Diesel Engine Division of General Motors in twelve additional counties in southwestern Indiana according to Melvin Luzader, vice-president and general manager. A complete line of GM diesel engines, parts and service are available on a 24-hour, round-the-clock schedule. Plans call for the opening of an office and service organization in Evansville in the near future. The twelve Indiana counties now being serviced by Western Services include: Sullivan, Greene, Knox, Daviess, Martin, Gibson, Pike, Dubois, Posey, Vanderburgh, Warrick and Spencer.

Little Rock Firm Named Hercules Distributor

Hercules Motors Corp. has appointed Moody Equipment and Supply Co., 8820 New Benton Highway, Little Rock, Ark., as Hercules distributor for the state of Arkansas. The Little Rock company, which offers a varied line of road construction and highway equipment, will handle Hercules' entire line of air-cooled and liquid-cooled diesel and gasoline engines and power units for industrial, agricultural and automotive equipment—engines ranging in capacity from 1 to 600 hp. One of the newest companies in its field, it is owned by former State Rep. Hal Moody, who is now Chief Clerk of the Arkansas House of Representatives. Other officials of the firm include: Cameron Glass, parts manager; Morris Dowdle, service manager, and R. F. Camp, secretary-treasurer. Mr. Moody was Southern district sales representative for Galion Iron Works for four years.

HERE IS IMPORTANT INFORMATION! The completely new 1958 edition of the **DIESEL ENGINE CATALOG,** Volume 23, is now available. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10½" x 13½", fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company orders to **DIESEL ENGINE CATALOG,** 816 N. La Cienega Blvd., Los Angeles 46, Calif.

A letter that speaks for itself...

INTERSTATE MOTOR LINES, INCORPORATED
"More Than a Truck Line — A Complete Transportation System"
Bonded — Mechanical Refrigeration — Insured

235 West 3rd South,
Salt Lake City, Utah,
February 5, 1959.

Mr. Jack Bradley,
Peerless Oil Dist. Co.,
1180 Beck Street,
Salt Lake City, Utah.

Dear Mr. Bradley:

We have now accumulated enough mileage on our tractors equipped with the Winslow full flow oil filter #8-931-E to give you a report on our experience. As you know, our oil drain period on the Cummins N H engine using the shunt type filter has been 6,000 miles. At this time we drain and refill the oil and replace the filter cartridge. Experience has proven to us that by using the Winslow full flow filter we can extend our drain period to 9,000 miles, at which time we drain and refill the oil and replace the filter cartridge.

Chemical analysis under these two separate conditions show the oil drained at 9,000 miles, using the Winslow full flow filter, to be in better condition than in the previous 6,000 mile drain period using the shunt type cartridge.

To date we have removed three engines from tractors for rebuild. These three engines have accumulated mileage as follows: 358,000; 402,500; and 408,000 miles, all three having been equipped with the Winslow full flow oil filter. It was not necessary to grind the crankshaft on any one of these three engines. These crankshafts were magnafluxed and polished and put back into service. There was less than .001 wear on both main bearing journals and rod bearing journals, which is Cummins tolerance even on a new crankshaft. I have sent you the main bearing and rod bearing inserts so that you yourself could see the condition of these bearings. We have never replaced used bearing inserts in a rebuilt engine due to the fact that they always show scuffing and dirt particles imbedded in them. You can readily see by the condition of these bearings that it would be possible to re-use them.

Cummins Engine Co. service topic of May 9, 1958, file # 1-26 points out the unnecessary replacement of bearing shells in the field. This is one other sizable savings in engine operation, together with the fact that these two proven points of extended life are an example of the prolonged life expectancy of other working parts in the engine, such as rocker arm shafts, bushings, liner and piston wear, and gear train.

At the present time we are operating more than fifty units in our fleet that are equipped with the Winslow full flow filters, and within the next few months we will be able to give you another report on further accumulated mileage.

Very truly yours,

Chas. S. Willis

Chas. S. Willis, Supt. of Maintenance,
Interstate Motor Lines, Inc.,
Salt Lake City, Utah.

cc: Mr. Charles Winslow

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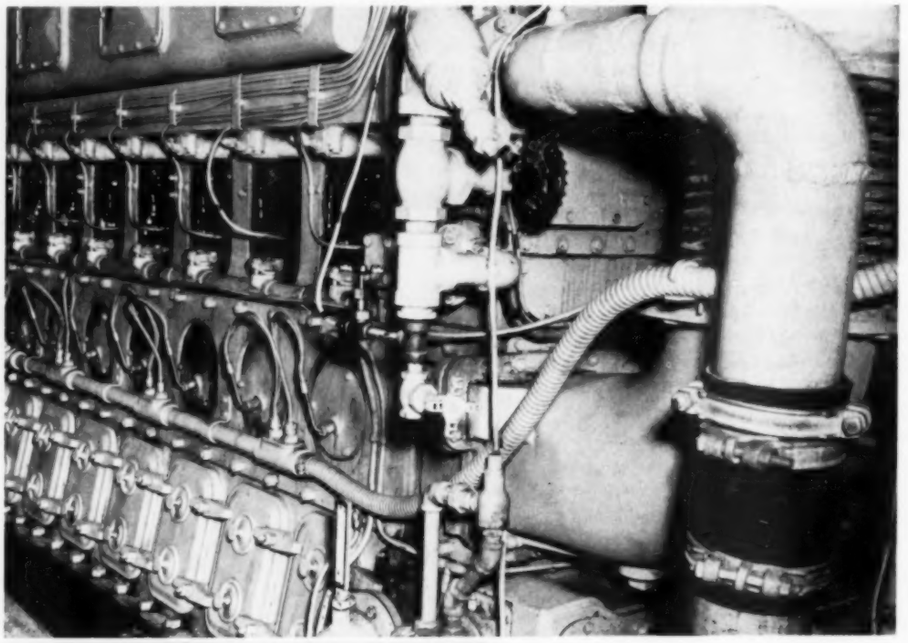
THE REJUVENATED TUG *INTERSTATE*

One 1320-hp Fairbanks-Morse Diesel Replaces Two Old Engines and Doubles Work Volume of Interstate Oil Transport Co. Vessel.

INSTALLATION of one 1320-hp Fairbanks-Morse diesel to replace two old diesel-electric units has enabled the tug *Interstate* to more than double the volume of work accomplished. Her owners, Interstate Oil Transport Company of Philadelphia, say the vessel is now "a tug and a half"—making oil deliveries in less time, moving more cargo, earning more profits. There is a rule in tow-boating that no money can be made with the towline coiled on the stern and, by the same token, slow barge movement means less efficiency and less dependable service. The faster they move, the more cargo can be carried in a given period of time, which means more revenue without an increase in units of equipment. There is no appreciable increase in the cost of hull maintenance and to date there has been no outlay for machinery repairs. By increasing the power in the *Interstate* with the new F-M diesel, tows are not only handled with greater dispatch, but the element of safety is improved, especially during the bad weather. The company bought the *Interstate* from a Milwaukee operator in 1953. The boat was originally designed and built in 1932 for the Ford Motor Company for Great Lakes operation and has never been out of fresh water. She was of extremely strong riveted steel construction to cope with ice conditions and buffeting by heavy tows on the lakes. Since the original power plant consisted of two diesels, two generators, a propulsion motor and rather elaborate switch gear, it is obvious that the installation of a compact direct-reversing F-M model 38D8$\frac{1}{8}$ diesel and Falk reduction gear would not pose any very great problem. Therefore, the engine was purchased and a contract was let to the RTC Shipbuilding Corp. of Camden, New Jersey, to make the conversion. No alteration was needed in the general arrangement of pilothouse, galley and crew quarters. About the only hull work required was to flair a few dented plates. The original engine foundation was built like a fortress and it was not necessary to change the angle of the original shaft log. It was necessary, however, to build up the engine bearers to bring the diesel in line with the tail shaft bore. All told the problems were not out of the ordinary. Most of the auxiliaries needed replacement but the motor-driven Ingersoll-Rand air compressor and the oil fired heating boiler were retained.

The main engine drives a 20 kw Safety Industries 120 volt dc tailshaft generator which, in conjunction with a 56 cell set of Exide batteries floating on the line, supplies electric service nearly all the time under way. Also a 20 cfm Quincy compressor, V-belt driven from the tailshaft, supplies compressed air for all except very long heavy periods of maneuvers. The main engine is connected to a Falk reduction gear with 3.542:1 ratio driving a Ferguson 4-blade bronze propeller. New intermediate shaft and tailshaft were required. The usual arrangement of Ross heat exchangers for the closed fresh water cooling system and lube oil cooling is employed. Both the air filter and the lube oil filter are made by Air Maze. The exhaust silencer is a Maxim and the new instrument panel has an Alnor pyrometer. The old sanitary and fresh water pressure set were replaced with new sets made by Fairbanks-Morse. The *Interstate* had not been in service long until the owners got a measure of her improved ability to work. The towing time was cut an average of 32% on routine jobs. The boat is now doing over twice as much work as she did with the old machinery.



Malie Joins Hawaiian Fleet

The *Malie*, a powerful dual-purpose tug, has joined the Hawaiian fleet of the Oahu Railway and Land Co. Powered by a Fairbanks-Morse opposed-piston diesel, the new tug will function both in harbor work and on the high seas. She is capable of handling the larger ships now entering Honolulu harbor and also will take barge tows between the Hawaiian islands. *Malie* is the eighth F-M powered tug in the company's fleet. The majority of her sisters, however, are designed either for long ocean hauls or for local berthing. The *Moi*, for example, recently embarked on a 6,000 mile trip to Kuwait in the Persian Gulf with a dredge in tow. Carl J. Nordstrom, designer of the *Malie*, felt that a good dual-purpose tug would be a real asset to her owners' growing fleet. George Hanson, Oahu Railway's vice president and assistant general manager of towboat operation, specified that the new vessel should have superior capacity for harbor work. "With larger ships coming to Honolulu", he said, "and with our boats doing

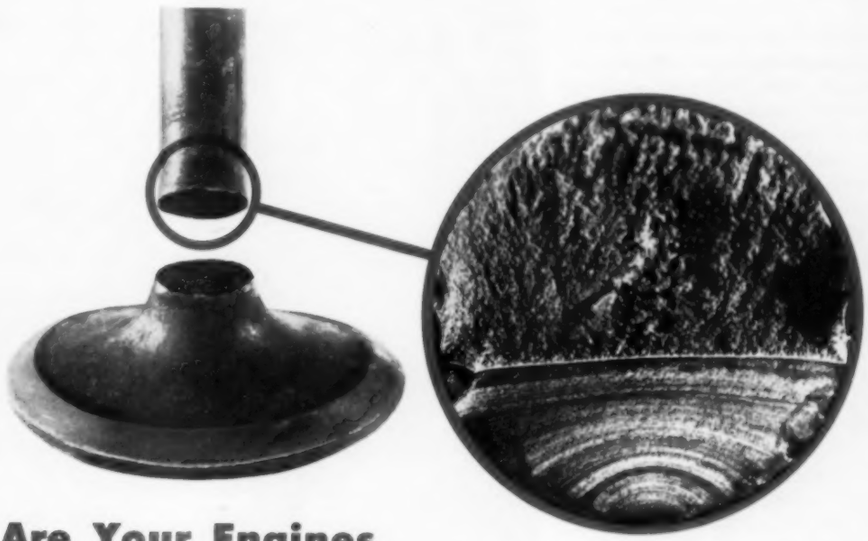
their berthing, we wanted to give them additional power in a tug." Along with that power came performance. The *Malie* was built in the Portland, Oregon, yards of The Albina Engine and Machine Works. On her trials on the Willamette River, she registered a top speed of 13¼ knots and a cruising speed of 12 knots with her OP diesel turning at 500 rpm. The delivery trip, however, proved to be her real trials. Journeying from her birthplace in Portland to Hawaii, via San Francisco, a distance of more than 2200 open sea miles, she ran into a force-seven gale and lost sight of the sun for the trip from San Francisco on. Despite these adverse conditions, she made the trip in nine days, three hours and fifty minutes for an amazing average of 8.4 knots.

Malie is an all-welded steel vessel, 91 ft. long and 84 ft. between perpendiculars. Her molded beam is 25 ft. with an overall beam of 26 ft., 8 in. She has a 12 ft., 2 in. draft at the propeller, rising to 8 ft., 4 in. forward. There are roomy accommodations for eight crew members aboard. The Fairbanks-Morse direct reversing opposed-piston diesel engine drives the Coolidge propeller at 200 rpm through a Western Seamaster 3:1 reduction gear developing a continuous rating of 1120 hp at 600 rpm. A Thomas 700 CM flexible coupling is used between the engine and gear. Maxim No. 28 silencers are installed on the OP. A pair of Quincy air compressors maintain pressure between 220 and 250 psig. in four storage tanks abaft of the engine for starting and for the Westinghouse pneumatic control system. One is 7½ hp for starting, the other is 2 hp for continuous operation. The system provides single lever control for all engine operations. Control stations are located in the engine room, pilot house and on the boat deck aft. *Malie's* big sisters, the *Moi*, *Mahoi*, *Eleu*, *Miki-Miki*, *Miki-Oi*, and *Miki Ali*, all with Fairbanks-Morse main engines, pumps and motors, have rendered notable service to the Oahu Railway and Land Co. in work on the high seas.

32 New Filter Cartridges

The Fram Corp., one of the world's largest manufacturers of oil, air, fuel and water filters, has developed 32 new filter cartridges for 1959. These new cartridges are for replacements for lube oil,

air and fuel oil cartridges on a variety of models and makes of trucks, busses, tractors, industrial and marine engines, cars, etc. For complete information on the new cartridges, contact the Fram Corp., Providence 16, R. I. (ITS NEW)



Are Your Engines Plagued by Failures Like This?

Eaton Engineers Can Help You Solve This Problem

The photographs above illustrate a typical fatigue-type failure caused by overstressing, in which fracture starts at the surface and, with repeated high stress, progresses to final break.

If you are an engine manufacturer and are having valve gear problems, Eaton engineers will be glad to consult with you and recommend procedures to help solve them. Or if you are designing new engines, perhaps our past valve experience can be valuable to you. Write, wire, or phone — there's no obligation.

Eaton Technical Reports are Available to Manufacturers

Eaton valve engineers will be glad to make a thorough study for you and furnish a complete technical report.

EATON VALVE DIVISION MANUFACTURING COMPANY BATTLE CREEK, MICHIGAN

PRODUCTS: Engine Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Hydraulic Pumps Truck and Trailer Axles • Truck Transmissions • Permanent Mold Iron Castings • Automotive Heaters and Air Conditioners Fastening Devices • Cold Drawn Steel • Stampings • Forgings • Leaf and Coil Springs • Dynamatic Drives and Brakes Powdered Metal Parts • Gears • Variable Speed Drives • Speed Reducers • Differentials • Centralized Lubrication Systems

Florida Diesel News

By **Ed Dennis**

J. KEITH Kelly, sales manager of J. Frank Knorr, Inc., Miami and Fort Lauderdale, has announced that his firm has been appointed Florida distributor for the Swedish built line of Volvo Penta marine diesel engines. Dealerships are now being set up at various Florida marine localities.

AT Babson Park, the Citrus Growers Distributors received a General Motors, 6030C (71 series), diesel with a GM power take off to power an 8 in. irrigation pump from General Engine & Equipment of Tampa.

WORLD'S largest construction agency, the Corps of Engineers, has spent, in Florida in 1958 $63,420,292 of which $42,619,846 was for military construction and over $20 million for civil works. Included in this last item was almost $6 million for Florida Flood Control projects. Over $28 million was spent at Patrick Air Force Base, home of the long range missiles.

TWO Harnischfeger, model 655 B, draglines powered with model 687-C-18 P & H diesel engines, rated 162 cont. hp at 1500 rpm, with Cotta transmissions were sold to Charley Toppino & Sons, Inc. of Key West.

AT Chiefland, the White Construction Co. had a model NRTO Cummins diesel, rated 225 cont. hp at 1800 rpm, installed in a Le Tourneau-Westinghouse ditch digger and the R. H. Strickland Co. of Quincy had a Rotor mixer delivered with an HR6-IP Cummins diesel developing a max. hp of 175 at 1800 rpm.

THE 118x36 ft. dredge *Hallandale* had two new General Motors 8-268-A diesel electric sets, with 290 kw Westinghouse generators, installed. John Huglen supervised the installation at Dade Drydock: two Ingersoll-Rand air compressors were also installed on this 16 in. dredge.

DIESEL Engine sales of St. Augustine constructed the 67 ft. *Captain Jet* for Deep Sea Trawlers of Fernandina Beach. It is powered by a 152 hp D342 Caterpillar diesel equipped with 3:1 r&r gears. Also the *Sally Ruth* of Mayport a 62 footer similarly equipped; supplied by the Gibbs Corp. of Jacksonville.

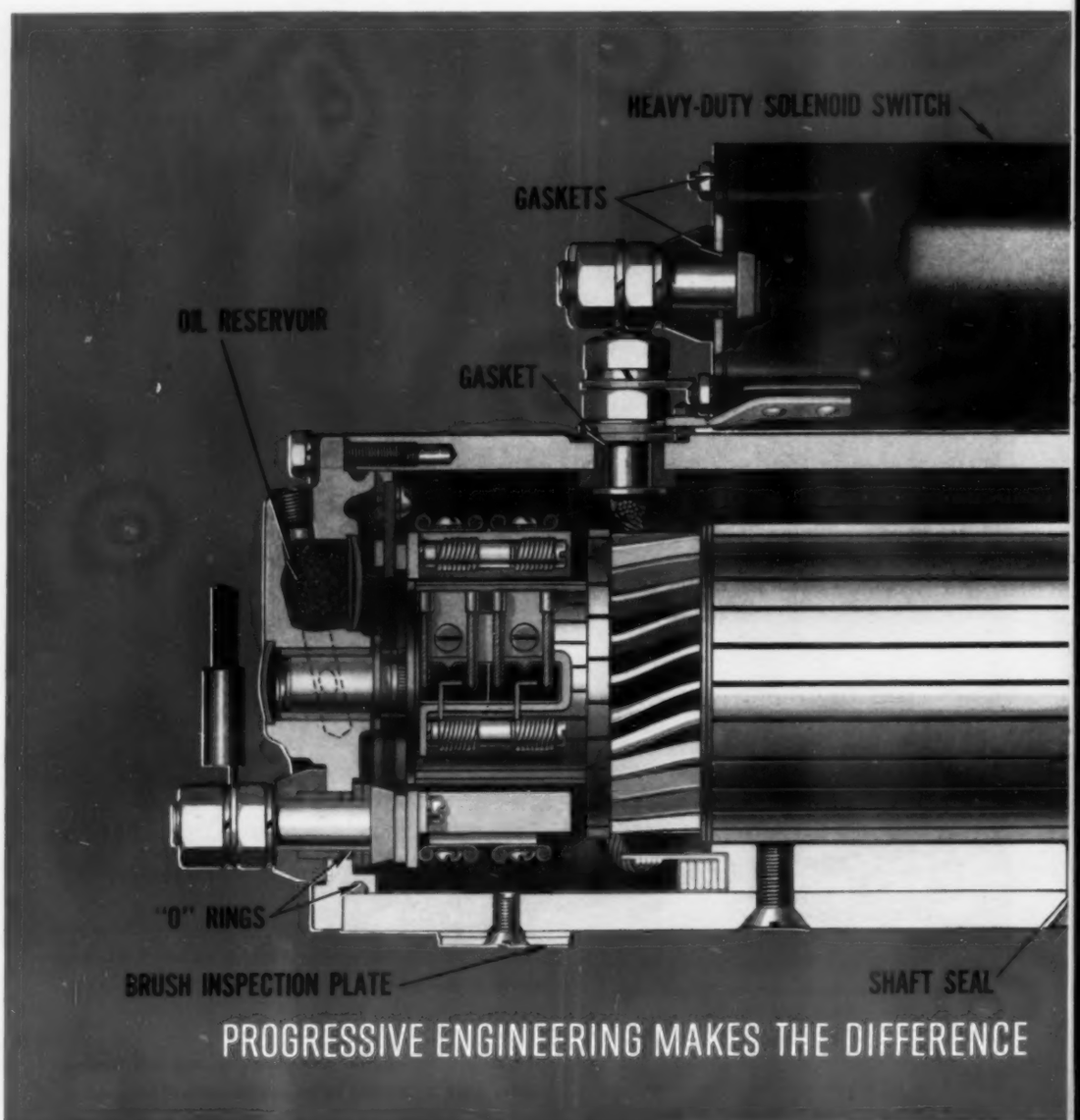
GULF Coast Engine Sales Inc. of Tampa supplied the model 273 Allis-Chalmers diesel engine, with Capitol 2:1 hydraulic r&r gears, for John Scildknecht's 36 ft. sponge boat operating out of St. Petersburg.

THE Banana Supply Co. recently added to their fleet the 140 ft. *M. V. Montego*. It is powered with two General Motors V6-278-A diesel engines and Falk 2:1 r&r gears and air clutch. It also has two 3-268 A GM powered 100 kw Delco generators.

TWO V16 Worthington, 4190 bhp at 450, diesel generating sets directly connected to 3000 kw Electric Machinery generators are scheduled to be installed this summer at the Marathon plant of the Florida Keys Co-op.

HACKETT Engineering Co. of Fairfield, Ala. had a 600 hp VT12-BI Cummins diesel engine installed in a #4500 Manitowoc crane and the Campbell Sand & Gravel Co., of Flomaton, installed a model NH6P Cummins, rated 220 max. hp at 2100 rpm, to run a Thomas sand pump.

TWO International TD6 crawler tractors, with dozer blades, are currently being used for land-scaping work on the Palmetto Bypass by the R. H. Wright Co. These are powered with the 50 net hp International diesel engine.



ANNOUNCING THE NEW DELCO-REMY TOTALLY

Delco-Remy now offers a completely new series of solenoid-operated, over-running clutch type heavy-duty cranking motors with the shift mechanism entirely enclosed. Special two-piece drive housings can be assembled to permit a total of 24 different solenoid positions with respect to motor mounting. New 50% longer brushes, together with sealing rings (optional) and large oil reservoirs (optional), assure extra-long operating time between overhauls. And Delco-Remy design features keep these heavy-duty cranking motors positively engaged until the engine starts. Engine manufacturers are invited to write directly to Delco-Remy for complete information and engineering assistance on the application of these new motors.

TOTALLY ENCLOSED DRIVE SHIFTING MECHANISM is protected against dirt, water, slush and ice. This enclosure plus the shaft seal and linkage seal also prevents transmission oil leakage.

TWO-PIECE DRIVE HOUSING DESIGN permits 24 different solenoid positions. Nose housings available in S.A.E. #2 and #3 mountings.

THE *Scotty III*, a 79 footer being built at Allied Marine, Miami, will be powered with a pair of the new General Motors V12 diesel engines of the 71 series; Twin Disc 2:1 r&r gears. This is reported to be the first installation of its kind in Florida.

PETTER 1500 watt diesel generator sets are part of the engine room equipment on the newly launched *Miss Dene* and *Capt'n Shrimpy*. These 67 ft. Diesel Engine Sales trawlers are equipped with 220 hp 6-110 General Motors diesels and 4.5:1 GM hydraulic r&r gears.

J. FRANK Knorr, Inc. of Miami, installed a Volvo Penta marine diesel engine with Capitol 2.5:1 hydraulic r&r gears in Capt. J. H. Lee's crawfish boat, the *Dragnet*. This new diesel is rated 82 bhp at 2500 rpm.

THREE 75 kw Fairbanks Morse diesel generating sets were installed at S2 of the Central & Southern Florida Flood Control District. These are model 49B4-¼ diesel engines.

TWO Caterpillar D342 100 kw diesel generating sets mounted in a Trailmobile trailer were shipped for use in a circus in the Dominican Republic by Auto Marine Engineers of Miami.

MICHIGAN #125 front loader powered with a model 195DC Waukesha rated 76 hp at 1800 rpm for R. H. Wright & Sons Contractors of Fort Lauderdale working on Highway A1A in Pompano Beach.

AT Jacksonville, C. K. Floyd & Sons built a 64 ft. shrimper and powered it with a model HRM Cummins diesel. This 6 cyl engine developes 127 cont. hp at 1800 rpm. 3:1 Twin-Disc r&r gears completed the installation from the Jacksonville Branch of Cummins Diesel Engines of Florida.

GENERAL Motors dieselized construction equipment that recently came into South Florida included a Galion road roller with a 2-71 for the B & G Contracting Co. of Fort Lauderdale, a model 4055-C in a Lima dragline for Warren Prescott of the same city and a 3057-C in an Insley dragline.

Flow Indicator Has Adjustable Range

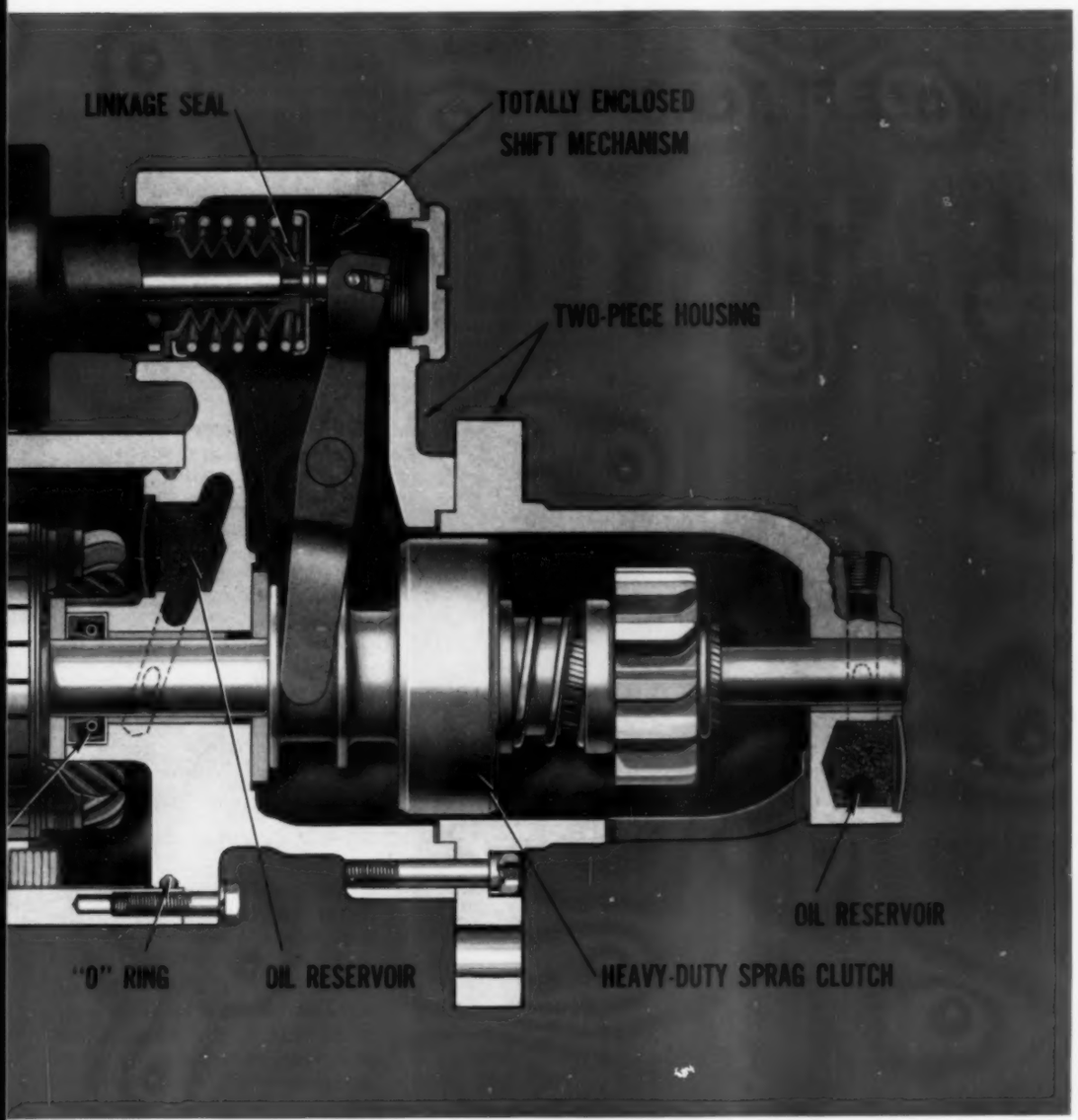
A simple, reliable safety signal, this indicator shows at a glance whether flow is taking place. Clearly visible from a distance, even in a bad light, a chromium plated ring spinning under a toughened glass dome has definite movement which precludes change of misreading. Useful wherever there is circulating water or oil, some specific applications are cooling water to diesel engines, oil coolers, air compressors; lubricating oil to bearings, gear trains, etc. The new variable flow models can be easily reset in the field for high or low range and are available with die-cast brass body in ½, ¾ and 1 in. pipe sizes for flows from 0.72 to 24 gpm. Other models are available for flows from .075 to 120 gpm in pipe sizes up to 3 in. Arkon Flow Indicators are available from McIntosh Equipment Corp.-Walker Crosweller Div., 15 Park Row, New York 38, N. Y.

ITS NEW

New Bendix Filter Bulletin

A new 2-page, two-color, 8½ x 11 in., three-hole punched engineering data sheet (No. 101) describing a line of 40-micron breather filters for free flow of clean air into hydraulic fluid, fuel and oil reservoirs is now available from Bendix Filter Division, Bendix Aviation Corp., 434 W. 12 Mile Rd., Madison Heights, Mich. The file sheet includes photographs of the filters, airflow pressure drop curves, operating description, cross section drawings and specification tables for the line of breather filters.

ITS NEW



ENCLOSED HEAVY-DUTY CRANKING MOTORS

HEAVY-DUTY SOLENOID AND SWITCH provide positive pinion engagement and safely handle maximum starting current. Special seals increase contact life.

SPRAG CLUTCH DRIVE operates with non-chamfered ring gear. Pinion indexes on spiral spline, positively engages ring gear before power switches on, and does not become disengaged with sporadic engine firing.

HEAVIER BRUSH INSPECTION PLATES resist damage from use and handling—are sealed to prevent leakage to motor interior.

GENERAL MOTORS LEADS THE WAY—STARTING WITH

Delco-Remy

GM GENERAL MOTORS

ELECTRICAL SYSTEMS

DELCO-REMY • DIVISION OF GENERAL MOTORS • ANDERSON, INDIANA

Mid-West Diesel News

By **L. H. Houck**

ALBERT Nelson, Emily, Minn., a Cummins NHC-4-P for powering a home-made sawmill from Cummins Diesel, Hibbing, Minn.

WAUKESHA diesel Enginator, 150 kw, powered with a Waukesha WAKDBS and a 25 kw Kohler diesel generator set to Richards-Gebaur AFB, Grandview, Mo., from AAA Engine & Electric Co., Kansas City, Kan. These units represent additional standby equipment.

ONE hundred and ten GMC COE diesel highway tractors to McLean Trucking Co., headquarters in Winston-Salem, N. C., with GM 6-71 super economy diesels developing 190 hp. New units are added to a fleet of 185 similar units, making a total of 295 GM tractors.

CITY of Aguilo, N.M., has purchased a Deutz air-cooled diesel 60 kw generator outfit.

A REPEATER radio station in Boise, Id., has installed two Deutz F1L air-cooled diesel engines driving 5 kw Kurtz & Root generators.

OBSERVED at Green River, Utah: Mack B-73 diesel with PIE label pulling two gasoline tank trailers for Black Oil Co., Blanding, Utah.

LAWRENCE Shaw has repowered an Autocar DC75T with a Cummins HRF-6-B from Cummins Diesel Sales Corp., Indianapolis, Ind.

FOR a ski tow in Aspen Highland, near Aspen, Colo., two Cummins diesels—an NRT-6-IPTC and an NT-4-IP. Purchaser Riblet Tramway Co., Highland Aspen, Colo. Sale made by Cummins Diesel Sales Corp., Denver.

TO Wise Truck Co., Rangely, Colo., Cummins NH-220 for repowering an IH RFD 402 from Cummins Diesel Sales Corp., Denver.

FORD diesel tractor was used to pull a Bros sheep-foot roller for compaction on the Hammond, La., highway job by AAA Contracting Co., Baton Rouge, dirt work contractor, which also used Allis-Chalmers TS-200 scrapers push-loaded by Allis-Chalmers Hd-15. Allis-Chalmers units had Allis-Chalmers diesel engines. Job was U.S. 190.

TO Herron & Strong Construction Co., Plattonville, Colo., Cummins 290 hp NHS-6 to repower a Kenworth truck, from Cummins, Denver.

ELLICOTT Machine Corp., Baltimore, has completed a new marine dipper dredge for American Dredging Co., Philadelphia. New machine dredges to a depth of 47 ft. and will excavate clay and blasted boulders. Power is 800 hp GM 8-567-C diesel generator set which supplies electric power for main machinery and auxiliaries. Hull is 112 ft. long and 48 ft. wide.

ARCO, Inc., Little Rock, paving contractor on Ark. 167 in the southern part of the state, used a Madsen asphalt plant powered with two Caterpillar diesel engines.

TRANSPORT Motor Express, Ft. Wayne, Ind., has repowered a Hendrickson BD-270-2 with a 190 hp Cummins HRF-6-B diesel from Cummins Diesel of Indiana, Inc., Indianapolis.

SIX 175 hp JT-6-B Cummins diesels to Central Wisconsin Motor Transport, Wisconsin Rapids, Wis., for installation in White 9000's, from Cummins Diesel of Wisconsin, Inc., Milwaukee.

VILLARD Machine Co., Milwaukee, has purchased a Cummins 220 hp NH-6 to

START WITH AIR-MAZE FILTERS

for dependable diesel service

Continuous service, efficient operation, low maintenance, guard the reputation of today's high output gas and diesel engines. That's why leading engine builders depend on Air-Maze to keep dirt out of intake air ... out of diesel fuels and all important lube oil.

Eight types of Air-Maze filters offer wide choice to meet *any* engine need.

For Normal Filtration – Type F cylindrical oil bath filters.

For Very Low Pressure Loss – Automaze self-cleaning curtains and LPD cylindrical oil bath filters.

For Lowest Initial Cost – Multimaze or DH panel assemblies are adequate where dirt load is low.

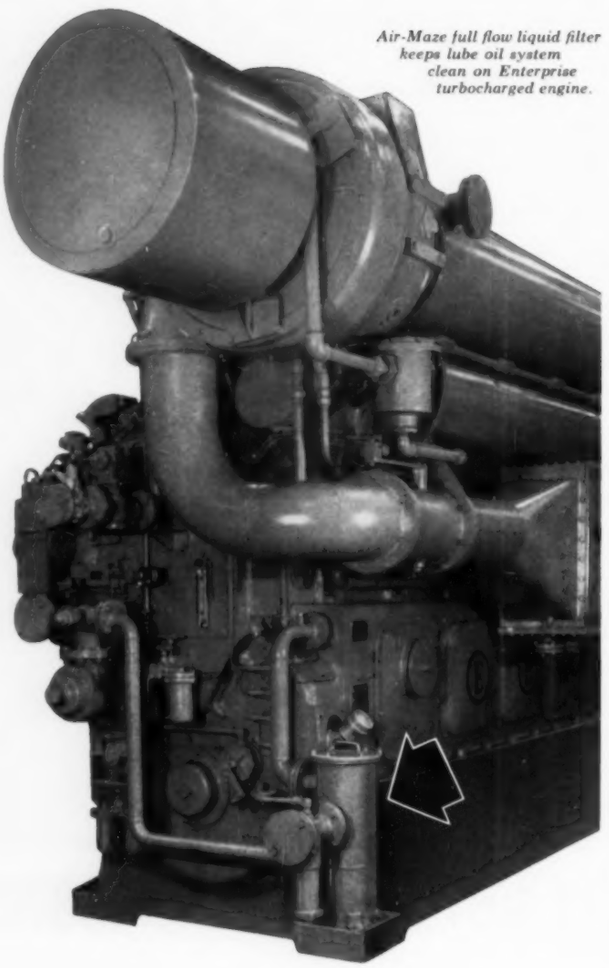
For Oil-Free Air – Type DA is indicated. Unaffected by normal fluctuations in air flow and temperature.

For Mobile Equipment – Type J stack-type and small size Type F are available.

For Sub-Micronic Dust Removal – Electromaze, electronic air cleaner.

For Oil and Fuel – Metal screen media, cleanable full flow filters, including duplex-type for dirt removal down to less than 10 microns.

For all-line catalog, write The Air-Maze Corporation, Cleveland 28, Ohio. Dept. DP-3.



Air-Maze full flow liquid filter keeps lube oil system clean on Enterprise turbocharged engine.

The biggest names in diesels are protected by Air-Maze filters

AIR-MAZE

The Filter Engineers

ENGINE AIR FILTERS • CAR BODY FILTERS • LUBE OIL FILTERS • OIL SEPARATORS • PASSENGER CAR FILTERS

drive an air compressor from Cummins Diesel of Wisconsin, Inc., Milwaukee.

DEUTZ A12L614 air-cooled diesel with Twin Disc clutch, extended shaft and outboard bearing to a sawmill operator in Northeast Maryland for powering a sawmill.

A WELL known 9 year-old Bucyrus-Erie Model 450 walking dragline, known to construction men all over the country as The Gentleman, is working for Badgett Mine & Stripping Corp., on the Cal-Sag Canal near Chicago, swinging a 15 yd. bucket, the Gentleman is powered by an 850 hp Cooper-Bessemer diesel. The famous rig worked on the St. Lawrence Seaway job in 50 below temperature during which the diesel was never stopped.

TO S. & H. Truck Lines, Fargo, N. D., a Cummins NH-220 to repower an IH DCO-405 from Cummins Diesel Sales, Inc., St. Paul.

TO Henry Pakkala, Hibbing, Minn., a Cummins 175 hp JT-6-B to repower an IHC truck from Cummins Diesel Sales Corp., Hibbing.

American Standard Forms Industrial Division

Formation of an Industrial Division by American-Standard, effective January 1, 1959, has been announced by Joseph A. Grazier, president. The new division was created by the consolidation of the American Blower, Kewanee Boiler and Ross Heat Exchanger Divisions. The Industrial Division will continue to manufacture and market the same products made by the three separate divisions. Among these are air handling and air conditioning equipment, commercial and industrial boilers, Fluid Drives, heat exchangers and surface condensers. Division factories are located in San Leandro, Calif.; Columbus, Ohio; Dearborn, Mich.; Kewanee, Ill.; and Buffalo, N.Y. President of the Industrial Division is John W. Brennan, formerly president of the American Blower Division. He will maintain offices at division headquarters in Detroit. Other division executives include: Richard S. Reade, vice president, manufacturing (formerly president, Ross Heat Exchanger Division); Elbert M. Palmer, vice president, customer relations (formerly president, Kewanee Boiler Division); Edwin W. Petersen, vice president, marketing; Richard L. Bernhard, vice president, engineering; Townsend Tinker, vice president, technical development; Wells A. Gardner, vice president, works manager; Albert O'B. Andrews, vice president, controller. Also appointed were Donald L. Clithero, general sales manager, and Howard C. Rollert, director of industrial relations. The field sales organization consists of a network of 14 sales regions covering the United States and 168 sales outlets—including branch offices and agents. Regional managers and headquarters cities are: Harley W. McClure, Boston; Joseph A. McCain, New York City; John A. Bishop, Dallas; Robert G. Schreiner, Cincinnati; George G. Waters, Pittsburgh; Graeme B. Supple, Detroit; John F. Tobin, Chicago; George M. Kendrick, Minneapolis; Carl Clegg, Kansas City, Missouri; Carl S. Becker, Denver; John V. Spainhower, San Francisco; Paul Wilcox, Los Angeles; Harold H. Hill, Washington; William J. McKinney, Atlanta. American-Standard, in addition to the Industrial Division, has eight other operating divisions within the United States.

HERE IS IMPORTANT INFORMATION! The completely new 1958 edition of the **DIESEL ENGINE CATALOG,** Volume 23, is now available. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10½" x 13½", fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company orders to **DIESEL ENGINE CATALOG,** 816 N. La Cienega Blvd., Los Angeles 46, Calif.

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SEVERE DIESEL SERVICE

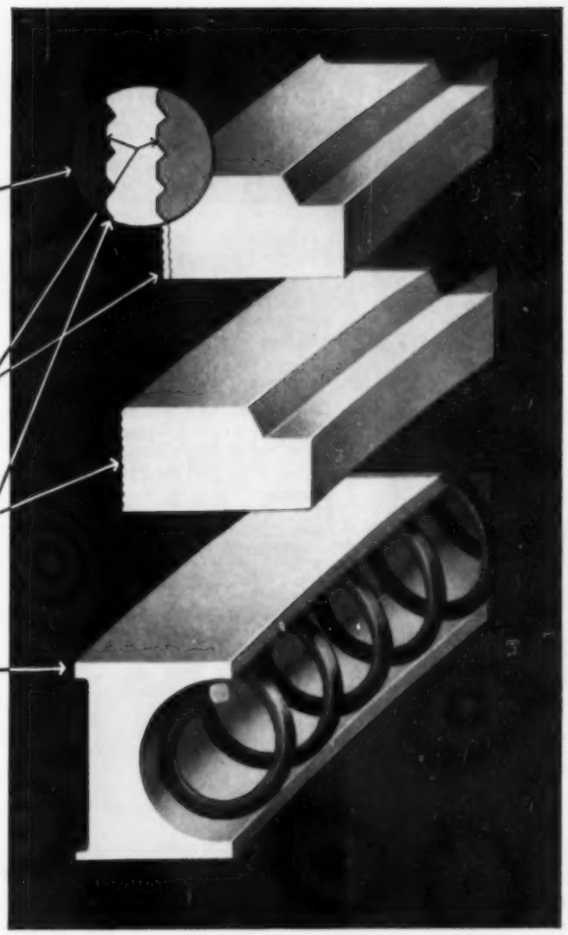
Precise pressure and pre-seated hard, solid chrome doubles life of rings and cylinders.

PRECISE CONTROL of correct ring pressure distribution for any particular type engine *plus* a pre-seated surface on ring face assures long life and eliminates tedious break-in period.

SOLID HARD CHROME PLATING on face of compression ring reduces the rate of wear to one-fourth that of unplated rings.

CORRECT FACE DESIGN on compression ring, tailored to specific applications, prevents blow-by and scuffing, yet provides immediate oil control.

CHROME 86 OIL RING features solid chrome plated steel faces to resist extremely high diesel pressures without scuffing, scoring. The result: thousands of hours of positive oil control and double life for pistons, rings, and cylinders.



Perfect Circles are engineered especially for diesel use!

PERFECT CIRCLE

PISTON RINGS AND POWER SERVICE PRODUCTS

Hagerstown, Indiana — Don Mills, Ontario, Canada

Michigan-Ohio News

By **Jim Brown**

PLANS for contract awards totaling $120 million during the first six months of 1959 were announced by State Highway Commissioner John C. Mackie's Deputy Commissioner-Engineering, Howard E. Hill, at the annual meeting of the Michigan Road Builders' Association in Detroit. Awards for the entire year 1959 are targeted at $220 million, with right-of-way and engineering bringing the total cost to $280 million.

KALAMAZOO District of the State of Michigan has purchased a model T-500 Galion Motor Grader powered by a Cummins diesel engine. The grader was purchased from the Grand Rapids branch of Wolverine Tractor & Equipment Co.

KOEHRING model 34-E twin batch paver powered with a GM 4-71 Detroit Diesel engine was recently delivered to Sargent Construction Co. of Saginaw, Mich. by Earle Equipment Co. of Detroit.

GREAT Lakes Steel Co. of Ecorse, Mich. has accepted delivery on a Hercules model DD226 diesel engine to power a blower for one of their furnaces. The unit was purchased from the Michigan distributors of Hercules diesel engines . . . . Cyril J. Burke, Inc. of Detroit.

HENRY Salvatore of Roseville, Mich. has purchased a Lorain model L-50 (1-yd) backhoe powered by a GM 4-71 Detroit Diesel engine with torque converter. The sale was made by the R. G. Moeller Company of Detroit.

WISEMAN Excavating of Detroit has accepted delivery on a Pettibone model 250 Speedall shovel with a 3¼ yd. bucket. The Speedall is powered with a GM 4-71 Detroit Diesel engine, is equipped with 20.5 x 25 tires, and is presently working on all types of loading and backfilling jobs in Ohio. The sale was made by Cyril J. Burke, Inc. of Detroit.

STARK Bros. of Erie, Mich. has purchased a P & H model 755 (1¾ yd) dragline equipped with a P & H model 687C-18 2-cycle 6-cylinder diesel engine. The new dragline will be used on highway construction work for Stark Bros. and was purchased from Panelli Equipment Co. of Detroit.

ON February 20th Peninsular Diesel Inc. held open house and played host to a large crowd of their customers, who came to see the new GM Detroit Diesel engine line which consists of 8 entirely new engines. A buffet lunch was given at Peninsular Diesel and chartered busses took many of the guests to the GM Diesel engine factory for a tour of the plant. All who attended felt the open house was a splendid success.

APPOINTMENT of Gene McNulty as manager of Cummins Diesel Sales Corporation, Iron Mountain, has been announced by C. R. Boll, vice-president of sales, Cummins Engine Company, Columbus, Indiana.

INTERNATIONAL model TD-24 crawler with cable dozer blade was recently sold to Carlton Excavating Company of Ypsilanti, Mich. by Wolverine Tractor & Equipment Co. of Detroit and Grand Rapids.

VITO'S Trucking Co. of Hazel Park, Mich. has recently purchased an Allis-Chalmers model HD6B diesel tractor equipped with a 6BE dozer blade. The new tractor was sold by Earle Equipment Co. of Detroit.

MODEL 154 Trojan 2-yd. loader equipped with 4-wheel drive and rear-wheel steering and powered by a GM 3055C Detroit diesel engine with torque converter was purchased by the Ann Arbor Construction Company of Ann Arbor, Mich. The new loader was sold by the R. G. Moeller Co. of Detroit.

ONE of the new 4-cylinder Cummins diesel engines, a model J-70-BI rated at 70 hp at 2200 rpm was recently sold to Frank P. Lipstraw of Oak Harbor, Ohio. The engine will be coupled with a 10 in. single plate Twin Disc clutch and installed in a Buckeye model 301 trenching machine. Engine supplier is Cummins Diesel Michigan Inc. of Dearborn, Mich.

INTERNATIONAL model TD-9 crawler with a Superior pipe laying boom was recently delivered to Somerville Construction Company of Ada, Mich. by Wolverine Tractor & Equipment Co.

FOUR Allis-Chalmers model HD6G tractors with Tractomotive TS-6 shovel attachments were purchased by the Great Lakes Steel Co. in Ecorse, Mich. The new tractors are equipped with heavy duty accessories for use in unloading boats for Great Lakes Steel, and were purchased from Earle Equipment Co. of Detroit.

BASELINE Construction Co. of Ypsilanti, Mich. has accepted delivery on a Northwest 1¾ yd. model 6 pull-shovel powered by a Murphy 20 diesel. The sale was made by Cyril J. Burke, Inc. of Detroit.

STANLEY B. Jones of Pontiac, Mich. has a new model 88L Austin-Western grader powered by a GM 3-71 Detroit diesel engine and torque converter. The grader was supplied by the R. G. Moeller Co. of Detroit.

ARTHUR L. Costello Company of Pontiac, Mich. has accepted delivery on a model 155A-LC P&H excavator (½ yd.) powered by a P&H model 287C-18 2-cycle diesel engine. The new excavator will be broken in on general excavating and was purchased from the J. R. Panelli Equipment Co., Inc. of Detroit.

PENINSULAR Diesel Inc. of Detroit has converted a Diamond T truck to diesel power with a model 6-71E GM Detroit diesel rated at 210 hp. The conversion was done for Ray Sergent of Ithaca, Mich.

ENGINEERING proposals for an $18-million bridge to link the Sault Ste. Maries of Michigan and Ontario were unveiled recently at Detroit. The man who prepared them is Dr. David B. Steinman, New York bridge expert who designed the $100-million Mackinac Bridge some 50 miles south of the proposed international span.

CUMMINS Diesel Michigan Inc. of Dearborn, Mich. has installed a model NH-220 Cummins 20° tilt engine rated at 2100 rpm in a model 9000 T. D. White truck. The installation was done for Allan McCaulley of Warren, Mich. who will use the White truck in hauling frozen foods.

ALLIS-CHALMERS model HD11B diesel tractor equipped with an 11BD hydraulic dozer blade was delivered to Charles Shear of Drayton Plains, Mich. by Earle Equipment Co. of Detroit.

GALION Iron Works & Mfg. Co. of Galion, Ohio, has just issued an interesting pamphlet covering the various types of compaction equipment in use today, including rollers and vibratory compactors. This informative, well illustrated, non-technical, 16-page treatise deals with

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Simplicity is the word for ROOSA MASTER fuel injection pumps. Small in size and weighing less than 10 pounds, there are fewer parts to service, fewer adjustments, which means lower service costs.
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the fundamental problems encountered in the efficient compaction of various materials, and the correct application of the many types of equipment available.

ALLIS-Chalmers model HD 21A tractor equipped with a hydraulic "U" bowl coal handling dozer and an all-steel fully enclosed cab has been sold the Huron Portland Cement Co. at Alpena, Mich. The sale was made by Earle Equipment Co. of Detroit.

WALTER Shanks of Napoleon, Ohio has a new Cummins 175 hp model JT-6-B diesel engine in his Diamond T 723 truck. Engine supplier is Cummins Diesel Michigan, Inc. of Dearborn, Mich.

MODEL C Tournatractor equipped with a Cummins HB15600 diesel engine was recently delivered to S. D. Solomon & Sons of Pontiac, Mich. The Tournatractor will be broken in on a highway construction job (U.S. 12 at Battle Creek) and was sold by Telford Equipment Co., Inc. of Detroit.

GRAND Traverse County Road Commission has accepted delivery on a model TD-20 International crawler tractor equipped with a cable bulldozer and power control unit. This TD-20 is one of the first of its kind in Michigan and was sold by Wolverine Tractor and Equipment Co. of Detroit and Grand Rapids.

GM TRUCK and Coach Division of Pontiac, Michigan has accepted delivery on a model HD6E Allis-Chalmers tractor equipped with a model 6GE angle dozer blade, a model E24 Carco winch, a push block and a fully enclosed all-steel cab for use inside and outside the plant. The tractor was purchased from Earle Equipment Co. of Detroit.

BUCYRUS-Erie 1¼ yd. model 30-B powered by an International model UD-525 diesel engine has been purchased by Harold R. Smith of Flint, Mich. The new Bucyrus-Erie will be used for sewer and water excavation and was sold by Wolverine Tractor and Equipment Co. of Detroit and Grand Rapids.

Additive for Residual Fuel Oil

Industrial plants using large amounts of residual fuel oil from their own storage tanks might save as much as $40 for each single dollar invested in a fuel oil additive that helps eliminate and prevent formation of burner-clogging sludge, the Du Pont Company says. A typical recent case in which the use of Du Pont fuel oil additive No. 2 has resulted in substantial savings is that of a Du Pont plant in New York State which reported that a little more than $50 worth of the chemical made it unnecessary to clean mechanically a 17,000 gal. storage tank. Mechanical cleaning would have cost many times the price of the FOA-2 and additional costs and inconvenience would have resulted from the heating system being out of operation during cleaning. In a similar application in another of its plants, the Du Pont Company says that $20 worth of the chemical added to a 50,000 gal. residual fuel oil tank eliminated a 6 in. accumulation of sludge in one week of operation with no equipment down-time, saving $800 in mechanical de-sludging and cleaning costs alone. What the chemical additive does, Du Pont chemists explain, is to "break up" sludge into particles so fine they're evenly dispersed through the fuel and are burned with the oil. The additive itself is nonmetallic and burns without leaving ash or other residue. Usable in all types of distillate fuel oils, including blends, Du Pont FOA-2 is added to the fuel oil, in the storage tank or work tank, at the rate of about 20 to 40 lbs./1000 bbls. of oil, which is the equivalent of about one-half to one pint of FOA-2 per 1000 gals. of heavy fuel oil. (ITS NEW)

Cummins Establishes International Subsidiary

Cummins Diesel International Ltd., established to promote the sale and service of Cummins diesel engines in international markets, was announced today by R. E. Huthsteiner, president, and Reece Hatchitt, director-international operations, of Cummins Engine Company, Inc. Cummins Diesel International Ltd. is headquartered in Nassau, The Bahama Islands, with additional offices soon to be opened in Europe and South America. While Cummins Diesel International Ltd. is a wholly-owned subsidiary of Cummins Engine Company, Inc., it will be independently staffed and operated. Mr. Huthsteiner said that Cummins Diesel International Ltd. already has formulated plans for expanding Cummins' existing network of 180 sales and service locations outside the U.S. and Canada, and studies are under way to determine the possibilities of establishing additional manufacturing plants to serve its world markets. Cummins Engine Company Limited, a wholly-owned subsidiary with a manufacturing plant in Shotts, Scotland, established in 1956, has been in production since May, 1957, and is serving Cummins customers throughout the world. "A substantial portion of Cummins production is now sold in International markets, and Cummins Diesel International Ltd. is a major step in our plans for further development of the Cummins work market," Hatchitt said. Mr. L. E. Carr, for many years manager of Cummins export distribution, has been named resident manager of the new Company in Nassau. He heads up a large staff of specialists well qualified to serve the needs of world trade. Cummins Regional Managers, and Sales Development, Market Development, Service, and Finance personnel will be based in Nassau, and the European and Latin American offices. By locating all its sales and service personnel abroad, Cummins Diesel International Ltd. will provide the maximum of coordination, communications, and service to its customers and dealers.

Cold Weather Diesel Operation

A bibliography of references to literature relating to efficient operation of diesel engines in extremely cold weather has been compiled for the Navy and released for industry use through the Office of Technical Services, U. S. Department of Commerce. It is described as follows:

Cold Weather Operation of Diesel Engines: A Bibliography—Part 2. M. W. Ayton, J. E. Shea, and C. R. Brown, Technical Information Division, Library of Congress for Office of Naval Research. Jan. 1958. 150 pages. (Order PB 131492 from OTS, U. S. Department of Commerce, Washington 25, D. C., $3.75.) This bibliography consists of references, with abstracts, to all unclassified reports dealing with the cold weather starting and operation of diesel engines appearing from 1939 to 1950, and a few from 1952 to 1954. References were drawn from a search of literature published by the United States Armed Forces and British and Canadian sources. Included is material relating to the starting and operation of diesel engines, and the use of antifreeze, batteries, starters, fuels, and lubricants at temperatures below –20 F. Information based on non-diesel experience with those items is also included, if it applies to cold weather operation. Publications available from the OTS collection of technical reports are so designated

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Harbormaster Outboard Propulsion and Steering gives your craft rugged power plus complete 360° maneuverability and the advantages of low cost installation, operation, and maintenance.

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West Coast News

By James Joseph

TO Imported Auto Transport Co., Long Beach, Calif., a Volvo D-47 diesel engine to power a 540-series GMC truck; and a Volvo 385 truck with Volvo D-67 diesel (115 hp at 2400 rpm) and 5-speed Volvo transmission.

AT McGrath, Alaska, Northern Commercial Co., which supplies electricity to the settlement, has installed its third Caterpillar D342.

LOS ANGELES' Diamond Oil Co. has purchased three Volvo engines, two 90 hp at 2800 rpm D-47s and a D-96, 150 hp at 2200, powering fuel oil delivery trucks for local delivery.

TO Coast Grain Co., Norwalk, Calif., a Cummins NH-220 for repowering a Peterbilt truck.

NEW sub-distributor for Volvo marine diesels in Washington, Alaska and part of Idaho is Seattle's Apex Marine & Equipment Co.

TO Ogden, Utah's Wasatch Oil Co., a Cummins JT-6-B 175 hp engine to repower a Diamond T 723 gasoline tanker.

REPOWERING the motor-sailer *Tiare Maori*, owned by South Pacific Trading Co. and operating out of Papeete, is a GA6 Union marine diesel. The ship, formerly the *Henrietta*, was featured in the movie, "Around the World in 80 Days."

FOR Weyerhauser Timber Co., Klamath Falls, Ore., six HD-16 crawler tractors with model 16,000 Allis-Chalmers diesels.

TO R. Anderson for repowering his boat, *Betty*, an Allis-Chalmers 6DCBMR-1879 with MG-201 twin disc marine gear and Young heat exchanger for cooling. Sale by Portland's Hamilton Engine Sales, Inc.

TO Marine Transport Co., Los Angeles, a Cummins JT-6-B 175 hp diesel repowering a GMC HRC-720 truck.

DELIVERED to Garrett Freightlines, Inc., two Allis-Chalmers lift trucks powered by 4B-152 Allis-Chalmers engines, for work in the trucker's Portland, Ore. warehouse.

THOMAS H. Ireland, Myrtle Creek, Ore., has taken delivery on two Cummins NH-6-B, 290 hp engines to repower Kenworth CD-523 trucks.

PORT of Los Angeles, in its just-released annual report, shows imports exceeding exports from Southern California—by $9 million, for second consecutive year. Imported machinery tonnage (including engines) was nearly double that exported.

SOLD to Golden State-Foremost Dairies Inc., Los Angeles, a Mercedes-Benz OM-636, 36 hp at 3000 rpm diesel engine to power Divco delivery truck. Sale by Wilmington's In-Mar Co.

TO Acme Meat Co., Los Angeles, a Cummins NH-220, repowering a Kenworth rig. Sale by Cummins Service & Sales, Los Angeles.

DELIVERED a Volvo D-47, 90 hp @ 2800 rpm to Tulare, Calif.'s Dairyman's Cooperative Creamery Assn. for their bulk grain delivery L-180 cabover International truck with Volvo 5-speed transmission.

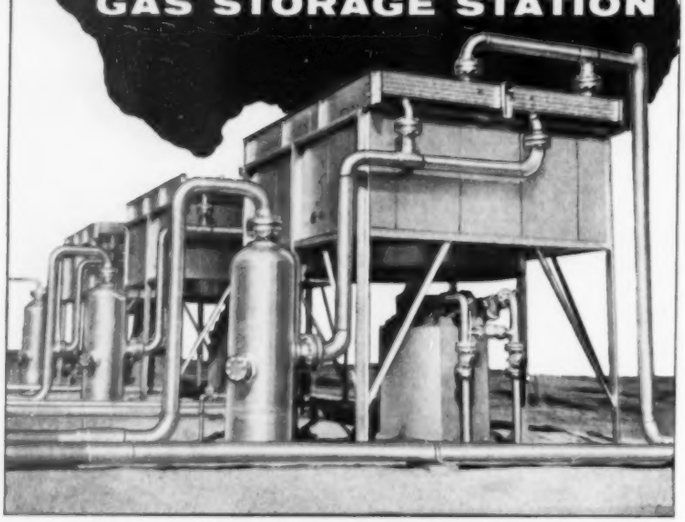
TO Wallace Logging Co., Bingen, Wash., a model 1-14 AKFOG Clark Torque converter for repowering logging rig operating White Salmon area.

FOR Klamath Basin Pine Mills, Inc., Klamath Falls, Ore., an Allis-Chalmers 6DAMR-273 marine diesel with heavy duty clutch and 1½:1 reduction . . . for company boat.

HC® UNITS by Young

do double duty cooling at

TEXAS GAS STORAGE STATION



Pictured are three Young Radiator Company HC-1210 coolers handling Gas Inter-Cooling at the Tri Cities Station near Athens, Texas

The Lone Star Gas Company utilizes six HC atmospheric coolers by Young at their gas storage station near Athens, Texas. Three of these units cool Engine Jacket Water and Lube Oil on three 1350 hp Cooper-Bessemer 2-cycle Engines. The other three units do the Gas Inter-Cooling, and are designed to handle a total of 48 MMCFD to 78 MMCFD under varying conditions . . . up to 1500 psi working pressures. Young HC Units are built for rugged service. Their versatility means you get job-matched performance, according to the requirement of the heat transfer problem. Young Design and Engineering experience in the Oil Field, Petro-Chemical and Chemical Processing industries is yours for the asking. Call or write your nearest Young representative about your present or future Heat Transfer problems. No obligation of course.

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1. Central Station Equipment Co. Tucson, Arizona
2. Flournoy & Everett, Inc. Downey, California
3. Jones and Laughlin Bradford, Pennsylvania
4. J. R. Mook Company Tulsa, Oklahoma, Houston, Texas
5. Frank Walz Denver, Colorado
6. Dutton-Williams Bros. Ltd. Calgary, Alberta, Canada
7. H. J. Young Muskegon, Mich.

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Napier Deltics for Bass Strait Ferry

A 3,810 ton twin-screw vehicle deck cargo ferry, ordered by the Australian Shipbuilding Board for the Australian National Line, will be powered by two turbo-blown Napier Deltic 18-cylinder high-speed light-weight diesel engines. Each Deltic will be coupled to a Stone-KaMeWa reversible controllable-pitch propeller through a Vulcan-Sinclair scoop-controlled fluid coupling and an Allen-Stoeckicht epicyclic reduction gear box. At the vessel's maximum service speed of 15 knots the Deltics will deliver a total of 4,000 shp. The engines' combined six-hour rating is 4,300 shp. The ferry, which is being built for service between Australia and Tasmania, will be 295 ft. long, with a maximum breadth of 57 ft. and a depth of 46 ft. 6 in. to the boat deck.

Bulletins Describe Hercules Power Units

Two new bulletins (P.U. 502-A and P.U. 504-B) describing Hercules 4-cylinder and 6-cylinder, overhead-valve, direct-injection diesel engine power units have been issued by Hercules Motors Corp. The new two-page bulletins—with double-sided, half-page fold-out flaps—are photo-illustrated and include complete details, specifications, power charts, dimension drawings, and "working load quick reference tables." P.U. 502-A describes the 4-cylinder model DD-226 units, which are available both as open and closed units. (The closed unit can also be furnished without side panels as a semi-open type.) These units are furnished as low profile (standard) units and can be furnished with an external fuel tank. They have 4 in. bore, 4½ in. stroke and develop up to 66 hp at 2,000 rpm. P.U. 504-B describes the 6-cylinder model DD-339 units, also available as closed or open units. These are standard *high* profile units. Bore and stroke are 4 in. and 4½ in., respectively, and the unit develops up to 100 hp at 2,000 rpm. Copies of both bulletins may be obtained by writing Hercules Motors Corporation, Canton, Ohio. (ITS NEW)

Lang Named Winslow Agency

Winslow Engineering and Manufacturing Co. has appointed Raymond I. Lang Advertising, San Francisco, as its advertising agency, effective immediately, it was announced today by William G. Nostrand, executive vice-president of Winslow. The agency will also be responsible for advertising of Winslow Aerofilter Corp. and Winslow Engineering, Inc. Nostrand announced. Mr. G. A. Duemling, assistant to the executive vice-president, will work directly with the agency formulating plans for enlarged national distribution of Winslow Filters. The companies have manufacturing plants in California and Kentucky, with head offices at 4069 Hollis St., Oakland.

New Brochure Describes Automatic Air Filter

Construction and operating characteristics of the new model B Roll-O-Matic automatic renewable-media air filter are described in a bulletin recently released by American Air Filter Co., Inc. Featured in the bulletin is a description of what the manufacturer calls its 'miracle' media—a 65-lineal ft. roll of impregnated, reinforced media composed of continuous, slightly curled, interlaced glass filaments that are held in place by a thermo-setting plastic bond to form a resilient pad or fluffy blanket having a nominal thickness of two inches. The new Roll-O-Mat media will not drip at temperatures up to 150° and will not lose its adhesive qualities to dryness. The filter's construction and completely automatic operation is explained part by part in the bulletin: a compact drive that will serve as many as six sections; "Cascade" timers in the control box which can be located on either side of the filter (outside the duct work) or wherever convenient; provision for re-rolling the used media tightly on the bottom spool for easy disposal; a media run-out switch that provides a signal light warning when the end of the Roll-O-Mat on the supply roll has been reached; simultaneous to the warning signal the circuit to the control is opened to make the filter inoperative until a new roll of media has been installed. The model B Roll-O-Matic's new modular design permits economical on-the-job assembly. The galvanized steel unit is constructed in sections for ease of handling, for more economical shipping, simplified warehousing and erection in the field. It also eliminates the need for expensive rigging at the installation site. The complete filter is shipped in six small cartons and is available in vertical sections of 3, 4 and 5 ft. nominally and in heights from 5 to 15 ft. in four inch increments. Dimensions and operating capacities also are a part of the new bulletin. Bulletin No. 248-C, which describes the new air filter, is available upon request from Dept. PD, American Air Filter Co., Inc., 215 Central Avenue, Louisville 8, Ky.

ITS NEW

Volvo Distributor Names Ferris

Mr. T. E. (Tom) Ferris has been appointed manager of the newly formed truck and tractor division of Swedish Motor Import, Inc., importers and distributors of Volvo products in the southwestern region of the United States. Mr. Ferris is a Bachelor of Commercial Science and has had over 20 years experience in retail truck sales. He was with International Harvester Company for 10 years selling their complete line including models powered with Cummins diesel engines. For three years, he was sales manager for a Gulf Coast area GMC diesel truck dealer. Recently he served as a City Truck Manager in Houston for Chevrolet Company. Mr. Ferris is a member of the Houston Chapter Society of Automotive Engineers. He will direct the sales of Volvo trucks and tractors in the nine state area served by Swedish Motor Import, Inc., and will operate from the company's headquarters in Houston, Tex.

119 Locomotive Engines ordered

An order for 119 of its latest-type turbocharged locomotive diesel engines has been awarded to The Cooper-Bessemer Corp. Representing $7,000,000 in new business, the contract is the largest single order for locomotive engines to be received by Cooper-Bessemer, according to F. M. Devin, C-B vice president. Bought by the Locomotive and Car Equipment Division of General Electric Company, Erie, Penn., the engines are for powering diesel-electric locomotives being built for the South African Railway as part of South African Railway Administration's $47,560,000 modernization program. The turbocharged diesel engines, specified on the newest contract, are Cooper-Bessemer type FVBL-12-T units. These 12-cylinder engines are rated at 1980 hp, and are equipped for full rated operation at altitudes up to 6800 ft. over extremely difficult terrains encountered in this South African Railway System. Forty-five Cooper-Bessemer locomotive diesels have been operating on this railroad for over a year, Devin points out. Scheduled for manufacture at Cooper-Bessemer's Grove City, Pennsylvania plant, and equipped with turbochargers built at the Company's Mount Vernon, Ohio works, the diesel engines will be shipped at a rate of one a week.

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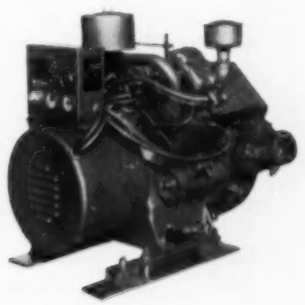
Constant research today will insure better industrial products for the future. American MARC is dedicated to that objective.

Diesel Engines
from 6 to 16 HP
Air & Water Cooled



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NO WEARING PARTS

Future maintenance costs and shutdowns are eliminated when you install Thomas Flexible Couplings. These all-metal couplings are open for inspection while running.
They will protect your equipment and extend the life of your machines.
Properly installed and operated within rated conditions, Thomas Flexible Couplings should last a lifetime.

UNDER LOAD and MISALIGNMENT ONLY THOMAS FLEXIBLE COUPLINGS OFFER ALL THESE ADVANTAGES:

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- Torsional Rigidity
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Main Drives
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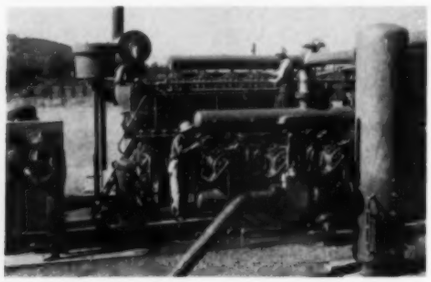
THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.

Gas Compressor Has Unique Control System

Late in the fall of 1958 the Atlanta Gas Light Co. put on the line this Wortnington 575 hp SLHC-6 angle gas engine compressor. Installed just north of Marietta, Ga., this new unit serves both industrial and home gas consumers located along the mainline between Atlanta and Bartow County.



This Worthington engine compressor is designed to handle natural gas at a suction pressure of 70 psig and delivers at discharge pressures ranging between 190 and 275 psig, depending upon the demand. Because of the great variation in required discharge pressure and capacity, the unit is arranged with 4 of its 6 compressor ends equipped with diaphram-type suction valve unloaders; the center cylinder is loaded at all times. The unique control system designed by Worthington is operated by natural gas taken at suction pressure and regulated to control gas pressure. Once the desired pressure has been determined the unit automatically will load or unload one or more of the compressor ends to give the correct capacity. For even finer capacity control, the engine also automatically varies between half and full speed within each unloading step, thus giving an infinite number of capacity steps at any discharge pressure between 190 and 275 psig. This unit was designed as a package unit with the engine compressor, cooling water heat exchanger, starting air system, and control panel all mounted on a skid approximately 30 ft. x 11 ft.

Hartford Promotes Two Engineers

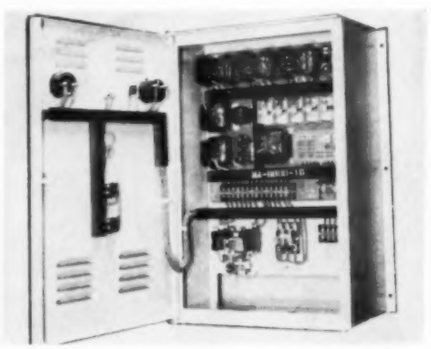
Mr. James J. Ford, general manager of the Fuel Injection Division of the Hartford Machine Screw Co., has announced the appointment of Ernest J. Willson as engineering manager of the Fuel Injection Division. Formerly associated with Automatic Diesel Electric Co. (later known as Petroleum Heat and Power) in New York City and in charge of the development laboratory of Baldwin Locomotive Works in Eddystone, Pa., Willson joined Hartford Machine Screw Co. in 1947. He became a field engineer and had charge of application work for the Roosa Master fuel injection pump. Later he was advanced to development engineer in charge of the Development Section. Mr. Ford has also announced the appointment of Thomas D. Hess to the position of chief development engineer vacated by Willson. After serving as a radio technician in the U. S. Navy and completing his studies as a graduate of Worcester Polytechnical Institute, Worcester, Mass. with B. S. degree in Mechanical Engineering, Hess became a project engineer in the Fuel Injection Division of American Bosch Arma Corp. in Springfield, Mass. He joined Hartford in 1956 as a field engineer in the Fuel Injection Division.

Ernest Willson

Thomas D. Hess

New Kato Regulator Units

As part of a continuing program in their complete systems approach to the control of Kato ac generators and power converting motor-generator sets, Kato Engineering Co. has developed static exciter and magnetic amplifier type voltage regulator units. Development work has been completed during the past three years and the company is now in full production with various sizes and types of regulator and exciter systems being manufactured, enabling the company to supply the best possible generator or motor control systems for each application regardless of the generator kw rating, frequency, phase or voltage. The single unit static exciter-regulators replace both the conventional rotating exciters and electro-mechanical types of regulators. The assemblies are mounted together with other necessary controls and indicators in heavy sheet steel wall mounted, generator base mounted or free standing cubicals of the dead front hinged door type. Heavy constructed Kato current transformers as well as best quality purchased meters, relays and other small components are used throughout. Motor starter systems for both synchronous and induction motors are also incorporated in the control system design.



Kato's policy of supplying complete control systems for all of its motors and generators permits in-plant testing of the rotating electrical machines together with the controls prior to shipment, insuring a safe dependable, thoroughly tested generating or power converting system and eliminating the problems involved in making in-the-field adjustments of make-shift controls. When generators are purchased by companies assembling them to engines, the company can supply both engine and generator control units mounted in single or separate cubicals. The line of Kato electrical machinery for which these control units are manufactured includes 60 cycle brushless and brush type AC revolving field generators from 5 kw to 400 kw; 60 to 400 cycle frequency changers and 400 cycle AC generators from 1 kw to 200 kw;

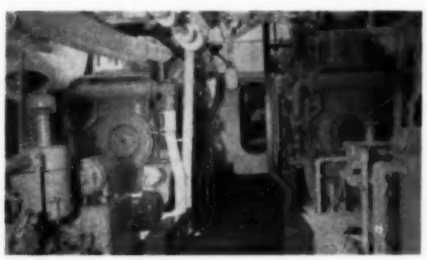
synchronous and induction motors; variable frequency motor generator sets; dc generators and other ac generators in many different frequencies, speeds and voltages. The units consist of a power magnetic amplifier, a transistorized dc amplifier and a sensing circuit with a Zener Diode reference. It is energized from the same 60 cycle source that drives the motor of the MG set. Separate Kato magnetic amplifier type regulators are utilized when other means of generator or synchronous motor excitation is desirable. Because of the nature of "brushless" generator design, rotating exciters must be used exclusively with these machines. Generator performance is greatly enhanced as voltage regulation is improved over other types of systems and response time and wave form is bettered. Complete performance and application information can be had by writing Kato Engineering Company, Mankato, Minnesota.

Florida Tug Launched

The 64 ft. *Gatco New York* was launched recently at Jacksonville, Florida by the Diesel Shipbuilding Co. Mrs. Charles B. Williams, wife of the manager of Gulf Atlantic Towing Company's

Twin screw tug *Gatco New York* on her trial runs. She measures 65 ft. by 17 ft. and draws 8½ ft. of water.

Jacksonville operations, christened the new craft with the traditional bottle of champagne across the bow of Gatco's 16th and latest towboat. The tug will be used for inland and coastwise towing in the Gulf of Mexico and along the Atlantic coastline. Like the other vessels designed and built by Diesel Shipbuilding, she is constructed of manually arc welded steel. Her hull is of ⅜ in. plate, the deck and bulkhead is of $\frac{5}{16}$ in. steel and the frames are of 3x2x⅜ in. angle steel. The keel is of box type welded construction and the bulkwark is of $\frac{5}{16}$ in. steel plate. To feed her two Caterpillar diesel engines, the vessel has a fuel oil capacity of 6000 gals. plus 90 gals. of lubricating oil and 1200 gals. of fresh water. The *Gatco New York* is powered by two D375 turbocharged



Engine room of the *Gatco New York*. Main propulsion is provided by a pair of D375 turbocharged Caterpillar marine diesel engines each rated 325 hp. The engines were supplied by The Gibbs Corp. of Jacksonville.

Caterpillar marine diesel engines which drive the 54x38 four blade Doran Southern propellers through 3:1 Twin Disc hydraulic reverse reduction gears and are rated 325 hp each. Two 30 kw ac 110/220 volt Caterpillar diesel electric sets are also in the engine room. The new towing vessel carries a crew of ten including the Captain.

Spray Starting Fluid Applicator

Spray Products Corp. has announced the development of an entirely new type applicator for their spray starting fluid. This new Instnstart applicator required over two years for testing and development before it was finally perfected. During that time this unit was field tested by many leading engine manufacturers and certain recommendations made by them were incorporated in the finished product. The applicator is unique, in that it was developed to use a standard can of pressurized spray starting fluid. It gives a quick start, is safe and convenient to use, fits any engine and is easily installed in a small space. The Instnstart applicator administers finely atomized Spray Starting Fluid into the intake manifold through a closed system. No wasting of fluid, no contamination of the air with odorous flammable vapors. There is no need to remove or bypass the air cleaner, thus no dust or dirt can get into the engine cylinder together with the starting fluid. For further information contact Spray Products Corp., P.O. Box 844, Camden 1, N. J. (ITS NEW)

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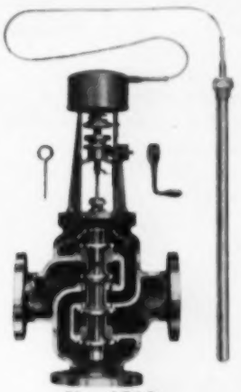
Whatever type of internal combustion engine you build or operate, chances are excellent there's a Fulton Sylphon control to help guarantee top efficiency with less maintenance . . . at lower cost! One-source manufacturing, outstanding quality and performance, field engineering assistance across the nation . . . to give you maximum *life* from your engine!



No. 1010 Temperature Regulator
For water or oil; controls flow of cooling water to maintain jacket water or lube oil at correct temperature. Automatic or manual-crank operation. Valve sizes ½" to 6".

No. 28 Vacuum Switch
On engines using paper air filter, cuts replacement cost . . . signals replacement need with light or horn. Ends filter inspections, premature discards, smoking exhaust; cuts fuel consumption.

Southwest Diesel Notes

By **Don Taylor**

DRILLING Co., J. P. Petkas purchased a Cummins 130 hp, 2500 rpm diesel, model JN-6-IP engine for an air compressor and crater pump on a drilling rig. Sale by Cummins Sales & Service, Inc. of Houston.

MORE MISSILES. Commerce Electric Supply Co. of Farmington, Mich. purchased two Stewart & Stevenson Special 30 kw, 400 cycle generator sets. Power by General Motors series 71, model 3030c diesel.

JAY BEE Manufacturing Co., Tyler, Tex. bought a 110 hp General Motors series 71, four cylinder diesel. Sale by Stewart & Stevenson Services, Inc.

CORE REEL for South America. Loffland Brothers Drilling Co. of Houston purchased a HRIP Cummins diesel engine to power a core reel on a drilling rig in South America. The engine develops 175 hp at 1800 rpm. Sale by Cummins Sales & Service, Inc. of Houston.

MIKE HICKS Tool and Cement Service, Inc. took delivery on a NHRS-6-IP Cummins 320 hp diesel. The unit will power a Gardner-Denver pump used in oil well cementing operations. The unit is mounted on a cabover Diamond T truck powered with a Cummins NHRS-6-B using an Allison 5640 transmission.

JACOBO Selem, Brownsville, Tex. bought a General Motors series 110, 6 cylinder model 62206 diesel marine propulsion unit equipped with a 4.5 to 1 hydraulic reverse and reduction gear. Sale by Stewart & Stevenson Services, Inc.

CONSOLIDATED Engineering Co. of Ft. Worth purchased a General Motors series 71, model 3045C diesel engine from Stewart & Stevenson Services, Inc.

SHRIMP Boat's a 'comin'. Western Seafoods Co., Freeport, Tex. has a new NHRS-6-M Cummins diesel. Sale by Cummins Sales & Service, Inc. Ft. Worth.

EARTH moving Euclid 18 FD's have NH-220 Cummins diesels. Owner of the two engines—Dolese Bros. Co., Big Canyon, Okla. Sale—Cummins Sales & Service, Ft. Worth.

ESSO Standard Oil Co. S. A. in New York purchased a General Motors series 71, twin 6's, model 12105 diesel, heat exchanger cooled. The destination will be South America. Sold by Stewart & Stevenson Services, Inc. Houston.

TO OILWELL Supply Division of U.S. Steel goes a Stewart & Stevenson model RD 20 rig lighting unit. It produces 20 kw, ac power.

QUARTZITE Stone Co. of Lincoln, Kan. installed a NH-180-B Cummins engine on a model 921 Diamond T truck tractor. Cummins Sales & Service, Inc. Wichita, Kan. made the sale.

E. L. FARMER & Co. Odessa, Tex. has a new engine on an LMSWX Mack oilfield tandem. Cummins Sales & Service, Inc. Odessa delivered a Cummins NH-220, 220 hp diesel.

CARDWELL Manufacturing Co. of Wichita, Kan. is installing a Stewart & Stevenson, model RD-20 rig lighting unit on a new drilling rig. The generator set is powered by a General Motors series 71, 2-cycle model 2030C diesel.

SOUTHWESTERN Industrial Electronics, Inc. purchased a General Motors series 71, four cylinder diesel, model 4031C closed type unit. The sale was made by Stewart & Stevenson Services, Inc. of Houston.

R. A. BAILEY, Palestine, Tex. bought a 110 hp, series 71, model 4030C open type General Motors diesel engine from Stewart & Stevenson Services, Inc. of Houston.

TEXAS Machinery & Equipment Co. will install a General Motors series 71, model 3055C engine in earth-moving equipment. Sale by Stewart & Stevenson Services, Inc.

KING Construction Co. of Houston installed a Cummins JT-6-B engine in a model R-200 International truck. The 175 hp diesel was sold by Cummins Sales & Service, Inc. of Wichita, Kan.

SCOTT Truck Lines, Hutchinson, Kan. bought a 220 hp NH-220-B Cummins engine from Cummins Sales & Service, Inc. of Wichita, Kan. The unit will be installed in a Mack truck.

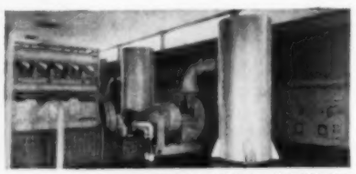
DRILLING Industry—A 600 hp Cummins diesel engine, model VT-12 was delivered to Lohmann & Johnson Drilling Co. of Great Bend, Kan. for installation on a model T-132 National drilling rig. The sale by Cummins Sales & Service, Inc. Wichita, Kan.

Hercules Engine Distributor

Welder and Industrial Services of St. Louis, Mo., distributors of welding equipment and supplies and engine-generator sets, has been appointed eastern Missouri distributor for Hercules Motors Corp. The St. Louis company also recently took over a former Hercules factory branch at Salem, Ill., and will make Salem its headquarters for Hercules sales in southern Illinois. It will handle the entire line of Hercules air-cooled and liquid-cooled diesel, gasoline and LPG (liquified petroleum gas) industrial and automotive engines—ranging in capacity from 1 to 600 hp. Welder and Industrial Services, founded in 1953, is headed by David S. Lewis, president. The Salem factory branch, which it acquired Aug. 1, was established by Hercules in 1937 and sold in line with Hercules' policy of turning over all factory branches to distributors. The home address of Welder and Industrial is 7001 Southwest Avenue, St. Louis 17, Mo.

Cooper-Bessemer Appoints Burkstaller and Adams

Appointment of William J. Burkstaller and Gilbreth D. Adams to the Cooper-Bessemer New Orleans field office is announced by George W. Edick, sales manager, Domestic Division, The Cooper-Bessemer Corp., Mount Vernon, Ohio. Formerly associated with the Cooper-Bessemer Odessa office, Burkstaller assumes the duties of sales engineer for the application of centrifugal and reciprocating compressors in the New Orleans area. In this capacity he will work under the direction of Freeman A. Gehres, branch office manager of the New Orleans field office and warehouse. A graduate in mechanical engineering from the University of Missouri, Burkstaller joined Cooper-Bessemer in 1955 and has been associated with the company's compressor division in engineering and sales. In his new capacity at the New Orleans office, Adams will assist in engineering and sales relative to the application of centrifugal and reciprocating compressors for chemical and the processing industries in the Louisiana area. A graduate in petroleum engineering from the University of Texas, Adams has been with Cooper-Bessemer since 1956 working in its headquarters engineering department.



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Absolute Pressure Transmitter

An absolute pressure transmitter, accurate to 0.5 per cent of full scale, has been announced by The Foxboro Co. A force balance instrument, the new type 13AA d/p cell transmitter produces a 3-15 psi linear signal proportional to absolute pressure. Since there is no direct drive of pen or pointer, full transmitter power is available to operate all standard receivers over long distances. The unit is essentially the same construction as the type 13A differential pressure (flow) transmitter, in that it built around a capsule-type, twin-diaphragm sensing element. Process pressure is introduced in the high pressure chamber. The low pressure chamber, evacuated and hermetically sealed, acts as a reference, with process pressures continuously compared to the absolute zero pressure. The force thus applied to the capsule acts through a force bar, a flapper-nozzle mechanism, a feedback bellows and a relay to produce the measurement signal and maintain the balanced condition of the transmitter.

Measurement ranges are continuously adjustable between 0-50 and 0-250, or 0-200 and 0-850 in. of water absolute. Transmitter parts exposed to process fluids are type 316 stainless steel. Overrange protection is provided to full 1500 lb. working pressure. Maximum operating temperature is 250 F. Complete details are available on request from The Foxboro Co., Foxboro, Mass.

ITS NEW

Goetz Appointed Sales Manager

Effective January 2, 1959, United Specialties Division of Industrial Enterprises, Inc. announces the appointment of Ralph W. Goetz as sales manager, succeeding M. T. Moler, who has resigned. Goetz has been active in the industrial sales field for the past fifteen years. He has been on United's staff for several years.

New Line Of V Drives

A completely new line of V belt drives, featuring smaller and lighter sheaves and V-belts of higher capacity at substantially lower cost, is announced by Dodge Manufacturing Corp. Introduced under the trade name Dyna-V, the new line of drives covers the complete range of horsepower capacities available in conventional drives. Savings in space, weight and cost are made possible by scientific advances in developing stronger metals for sheaves, and synthetic rubbers and fibers for belts. With the Dyna-V line, the majority of industrial drives can be handled with belts only 3/8 in. wide, and sheaves that are greatly reduced in both width and outside diameter. Economy of space is a vital factor in machine design. These new drives will offer the design engineer opportunities for saving space and cutting costs in power transmission. Smaller and lighter sheaves also tend to prolong bearing life. Dyna-V drives are being offered in two standard groove sizes to meet all except the largest industrial requirements. Besides the 3/8 in. (nominal top width) size, known as 3V, the company is manufacturing a 5V, or 5/8 in. size for higher horsepowers. Sheaves in the 3V series, from one to 10 grooves, are designed for drives ranging from one to 50 hp. The 5V series will include sheaves to take from three to 10 of the 5/8 in. belts, and will handle drives up to 200 hp. There is also an 8V series of made-to-order Dyna-V sheaves and one-inch belts, for even higher horsepower requirements, ranging up to 1500. Taper-Lock bushings for quick and secure mounting on shafts will be an important feature of Dodge Dyna-V sheaves. They contribute to clean and efficient design, and have become a widely accepted means for interchangeable mounting of wheels on shafts. Dyna-V belts, besides being smaller in cross section, lighter in weight and stronger, are exceptionally immune to stretching. This solves the problem of matching belts for uniform tension. The new belts are designed with a crowned top and concave sidewalls for maximum efficiency. They will have all the premium qualities, being oil and heat resistant and static conducting. The new Dyna-V line will be available from distributor stocks. It will supplement the regular lines of Dodge sheaves and V belts, which will continue to be manufactured and stocked. Descriptive bulletin available on request. Write Dodge Manufacturing Corp., Mishawaka, Ind.

ITS NEW

Swanberg to New York Office

Assignment of Sven T. G. Swanberg to the Cooper-Bessemer New York field office is announced by Grant C. Woodard, general sales manager of The Cooper-Bessemer Corp., Mount Vernon, Ohio. In his new position at the New York office, Swanberg will assist in engineering and sales relative to the application of centrifugal and reciprocating compressors for chemical and processing industries. In this capacity he will work under the immediate direction of C. J. Havekotte, Cooper-Bessemer's New York branch manager. A graduate in Mechanical Engineering from the University of Stockholm and from the General Motors Institute of Technology, Swanberg holds a mechanical engineering degree. Since joining Cooper-Bessemer, he has been associated with the New York office of the Cooper-Bessemer International Corp. as sales engineer for a period of four years. For a period of time he was branch manager of the Cooper-Bessemer International, Havana, Cuba office.

DIESELS ON WATER?

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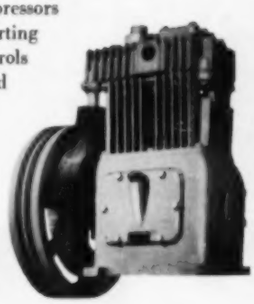

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Lynn McGuffy Appointed By Burgess-Manning

Appointment of the Lynn McGuffy Co., Inc., as sales representatives of the Industrial Silencer Division of Burgess-Manning Co. was recently announced by W. A. Carroll, Jr., sales manager of this division. As such, the company will be active in the sale of Burgess-Manning snubbers for the elimination of pulsation in gas pipe line systems and excessive intake and exhaust noise from internal combustion engines, compressors, blowers, etc. The Lynn McGuffey Co. was founded by Lynn McGuffy, president, in 1952 as a sales and service organization for equipment used in gas and oil pipe lines, and compressor installations. The company was very successful and now represents a group of distinguished manufacturers, including, in addition to Burgess-Manning, such companies as American Air Filter and Hilliard Corp. Lynn McGuffy Co., Inc., from its headquarters in the Sklar Bldg., Shreveport, La., will represent Burgess-Manning in southern Arkansas, northern Louisiana and northern Mississippi. In addition to Lynn McGuffy, Harry Tindel, vice president at Shreveport, and Carrol Bagby, sales engineer, with headquarters at Baton Rouge, will be particularly active in the promotion.

Diesels Benefit O.K. Motor Service

An "experiment" with diesel power in 1956 by O.K. Motor Service, Inc. proved to be the single most important profit-making action in the 37-year history of the company. Today, President Anthony F. Cosentino's over-the-road fleet is all diesel—18 Cummins-powered Diamond T tractors, including five powered by the recently-introduced 180 hp Cummins NH-180 engine.

Reports 'Tony' Cosentino: "Since switching to diesel, we have more than doubled our miles per gallon of fuel, cut the number of over-the-highway units by 62 per cent, reduced $20,000 in parts inventory, and carry 6,000 lbs. more per trip in payloads. I have found Cummins and Diamond T a good combination for reducing operating costs." O.K. Motor Service hauls beer, steel, roofing material and other commodities between Chicago and Milwaukee, with each tractor making three round trips every 24 hours. The tractors average 100,000 miles per unit per year.

Publication Salutes Twin Disc Anniversary

Forty Years of Progress Along Production Road, is the title of the feature story in the latest issue of Twin Disc Clutch Company's magazine, Production Road. Commemorating the company's 40th anniversary, the article recounts the remarkable history of engine-powered machinery on land and sea since 1918, the year of Twin Disc's founding. Special attention is given to the development of the many Twin Disc products which enabled industry to apply its new-found power to productive work. Among these power transmitters are friction clutches, power take-offs, fluid couplings, torque converters and marine gears. Other stories in the current Production Road cover pipeline, oil well, machine tool, construction and logging installations. Also featured are details about three new Twin Disc products: the MG-512 Marine Gear for marine engines producing up to 300 hp at 1800 rpm; the 1100-Series single-stage torque converter, a "stripped" unit for OEM applications; and the model DOC oil-actuated multiple-plate clutch which features a built-in oil collector. Production Road may be obtained by writing The Editor, Twin Disc Clutch Co., Racine, Wis. (ITS NEW)

Raymond Heads SAE

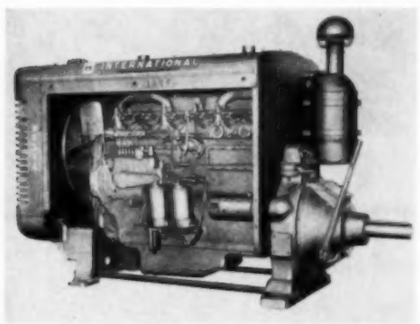
Mr. Leonard Raymond, chief automotive engineer for research at Socony Mobil Oil Co., Inc., has been elected president of the Society of Automotive Engineers. Announcement of Raymond's election was made at the Society's annual business meeting in Detroit in January. Mr. Raymond has been in automotive research since obtaining his master's degree from Columbia University in 1928. He has been active in the Society for many years, and has served on a number of committees. Prior to his election he held the position of Councilor of the Society, and served as chairman of the Publications Committee. Joining Socony Mobil in 1945, Raymond first was attached to the company's Research and Development Laboratories at Paulsboro, N.J. He was appointed to his present position last year. He has written a number of scientific papers on engine oils, fuel additives, gear lubricants, and the use of liquefied petroleum gas as a motor fuel.

Dust-Free Cartridges

New dust-proof polyethylene bags are now being used for packaging all diesel fuel oil filter cartridges made by the Fram Corp. This new packaging assures customers that Fram cartridges will be free of dust and contamination and in the same high-quality condition existing when the units were first manufactured. A printed paper label is included in each polyethylene bag along with the cartridge. It is easy to read and gives the cartridge model number, application and installation instructions. (ITS NEW)

International Power Units

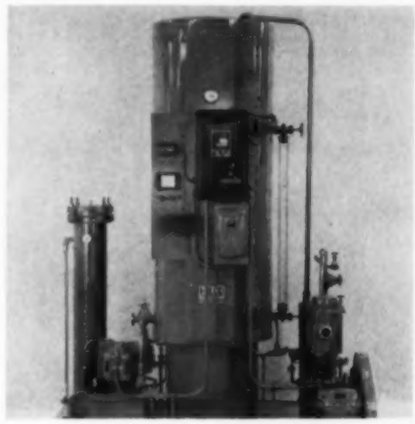
International Harvester's growing line of International power units has been augmented with the addition of two new diesel models, designated the UD-554 and the UD-370. The six-cylinder UD-554 boasts 121 net hp at 1,800 rpm, and the four-cylinder UD-370, 80 net hp at the same rpm. Increased power and faster heat dissipation to cooling water is made possible by increasing cylinder bores 1/8 in. through the use of new thin-wall, centrifugally-cast, replaceable sleeves. New aluminum alloy pistons with chrome-plated top rings give the UD-554 and the UD-370 a 16.5:1 compression ratio for fast compression ignition and excellent fuel economy. Better oil control and improved power sealing for higher speed operation are provided by five piston rings, all of them above the piston pin. Uniform heat dissipation is achieved through new type cylinder heads with improved coolant flow. The efficient overhead valves have positive rotators on both intake and exhaust to keep stems and seats free of troublesome deposits for long valve life. The UD-554 has six 4 5/8 x 5 1/2 cylinders, with a fully counterbalanced seven-bearing crankshaft and torsional vibration damper for smooth, dependable performance. The UD-370 has four 4 5/8 x 5 1/2 cylinders, with a fully counterbalanced five-bearing crankshaft, and a gear-driven eccentric weight-type balancer for six-cylinder smoothness with four-cylinder economy. Both engines have many interchangeable parts, among them cylinder sleeves, pistons, connecting rods, injectors. Dependable, all-weather push-button starting is an extra advantage for use in such machines as 3/4 to 1 1/4 cubic yard shovels, medium and heavy-duty motor graders, 50 and 75 kw maximum output generators, 250 and 400 cfm air compressors (1,800 rpm), portable saw mills, irrigation and drainage pumps, heavy-duty road rollers and medium and heavy-duty ditchers and trenchers. ITS NEW



This International UD-554 six-cylinder unit is rated at 1,800 rpm for continuous duty, with 121 net hp (intermittent) and 102 net hp (continuous). As an engine, the UD-554 develops 150 max. belt hp at 2,300 rpm.

New Hilco Oil Reclaimer

The Hilliard Corp. not long ago perfected the Hilco Hyflow Oil Reclaimer model 25-X. A relatively compact system occupying a space of only 3 x 6 ft., this Hilco oil reclaimer is designed for purification of sealed transformer insulating oil prior to its delivery to the transformer charging boards. The new 25-X consists of an inlet filter utilizing fullers earth filter cartridges, submerged inlet and outlet rotary gear pumps each driven by its own motor for automatic operation, an electrically heated vacuum vaporizer with a built-in 60 gal. vacuum storage tank, and a vacuum pump capable of producing 50 microns vacuum during oil processing. Featured on the new 25-X oil reclaimer are the utilization of a single cylinder for the vacuum vaporization chamber and vacuum storage tank, automatically operated inlet and outlet delivery pumps to prevent pumping air to the transformer charging board, and delivery of oil to the charging board with a moisture content of less than two parts per million. ITS NEW



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This is a **must** for you. It can't help but be a valuable aid to your judgement when examining, selecting, selling, recommending, or learning about diesel or natural gas engines.

Carrying envelope, instructions, and this 10-inch "DIESEL-DIAL ENGINE FINDER©*" of tough moisture-proof plastic, all for only $15.00 (add 4% tax for California addresses only). Send check and we pay postage; otherwise all orders shipped C.O.D. . . . sorry but the sales margin doesn't provide for expensive billing. Make check payable to "DIESEL-DIAL" and mail now, while you're thinking of it, to:

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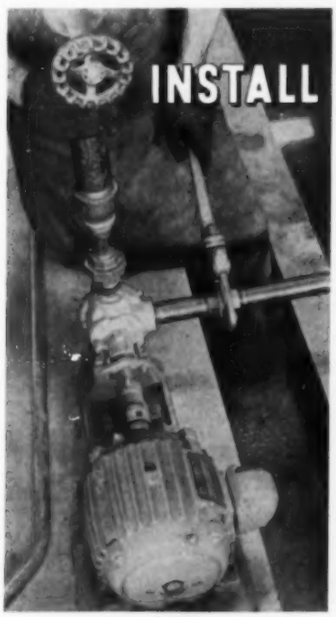

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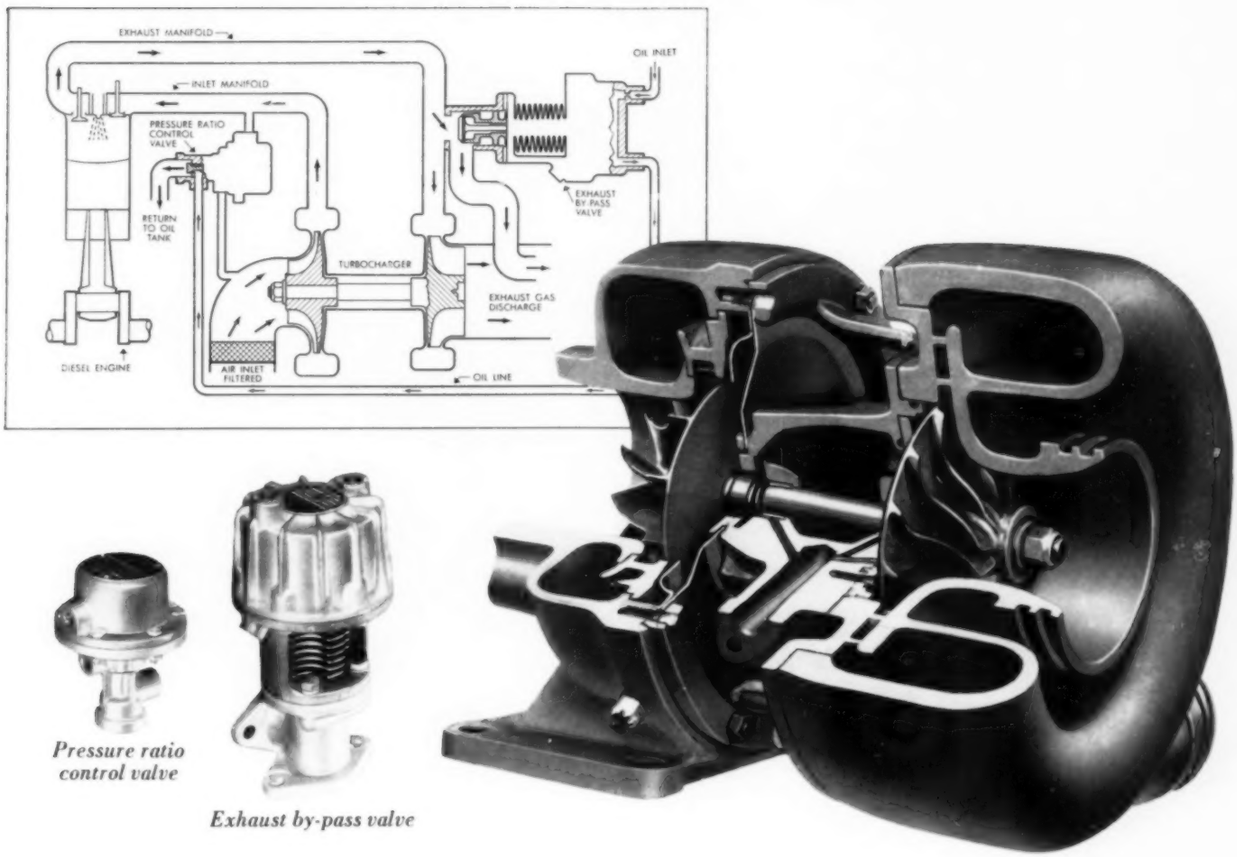

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